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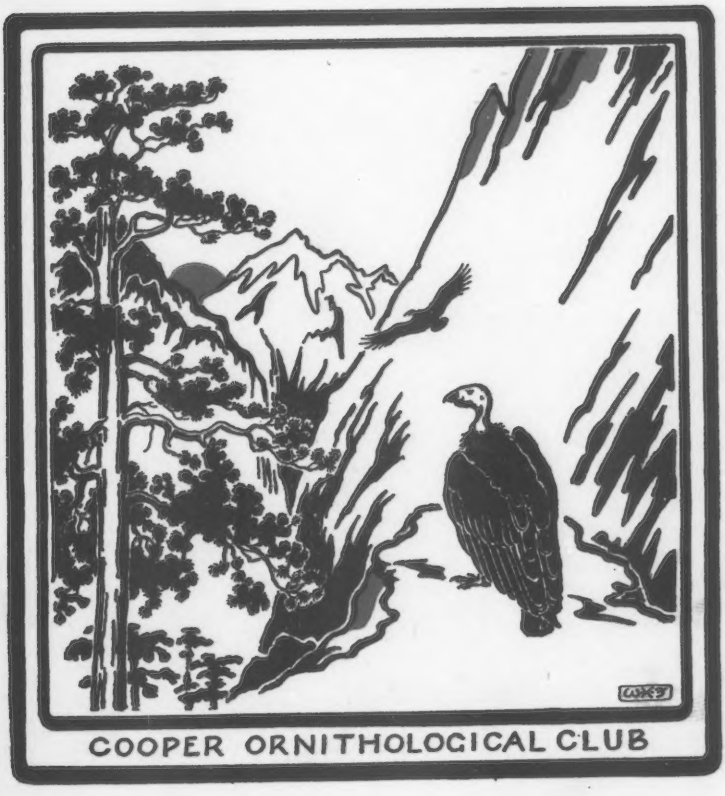
THE CONDOR

A Magazine of Western Ornithology

Volume XLII July-August, 1940 Number 4



COOPER ORNITHOLOGICAL CLUB

THE CONDOR

A Magazine of Western Ornithology

Published Bi-monthly by the Cooper Ornithological Club
Entered as second-class matter May 15, 1925, at the post-office at Berkeley, California, under Act of Congress of February 28, 1925, Section 412, paragraph 4.
Issued from the Office of THE CONDOR, Museum of Vertebrate Zoology, Berkeley, California.

SUBSCRIPTION RATES

Three Dollars per Year in the United States, payable in advance.
Fifty Cents the single copy.
Three Dollars and Twenty-five Cents per Year in all other countries in the International Postal Union.

COOPER ORNITHOLOGICAL CLUB

Dues are payable in advance on January first for the calendar year: Three Dollars per year for members residing in the United States; Three Dollars and Twenty-five Cents in all other countries. Members whose dues are paid receive THE CONDOR without additional charge.

The Life Membership fee is Seventy-five Dollars. No additional dues are required, and the money is invested and the interest only is used for Club publications. Life Members receive The Condor without additional charge.

Send manuscripts for publication to the Editor, ALDEN H. MILLER, Museum of Vertebrate Zoology, Berkeley, California, or to the Associate Editor, JEAN M. LINSDALE, same address.

Send dues and subscriptions to JOHN McB. ROBERTSON, Associate Business Manager, Buena Park, California; orders for back numbers of THE CONDOR and the PACIFIC COAST AVIFAUNA series to W. LEE CHAMBERS, Business Manager, 2068 Escarpa Drive, Eagle Rock, California.

Issued July 15, 1940

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THE CONDOR

VOLUME XLII JULY-AUGUST, 1940 NUMBER 4

EIGHT YEARS OF BANDING OF WESTERN GULLS

WITH FIVE ILLUSTRATIONS

By REED W. FERRIS

While the banding operations here recorded date back to July, 1930, and cover eight seasons, the first season is included only because of certain incidental observations, no significant number of gulls having been banded in that year and no returns having been received to date. The banding for the seven subsequent seasons was done on Haystack Rock, about a mile offshore from Cape Kiwanda, Tillamook County, Oregon.

This rock is a fairly large half dome, 327 feet high, covering perhaps two or three acres at the base. The south side is steeply terraced, the east, landward side almost sheer cliff for the lower two-thirds, interrupted by a few inaccessible grassy ledges. The west slope is broken by three steep but shallow, heavily sodded ravines that run down to within 100 feet of the water, whereas the northeast side is practically a sheer drop for the full 327 feet to the water. Precariously poised bits of turf that cling to the ledges of the north and east cliffs are perforated by Tufted Puffin burrows, and presumably by petrels also, as are the sod slopes of the west side, where Puffins, Beal and Fork-tailed petrels, Baird and Brandt cormorants, and a few of the gulls nest. The south ledges furnish nesting sites for a few more of the gulls, and formerly for the Farallon Cormorants, the latter having been driven in more recent years to the less accessible southeast shoulder of the rock by the persecution of the fishermen who land and destroy their nests and young. The main colony of Western Gulls (*Larus occidentalis occidentalis*) is on the more or less rounded and bare top of the rock, where nests in a good season must number 300 or more.

Size 6 aluminum bands of the Biological Survey were used and only young gulls were banded. The actual banding was done by the author with the aid usually of one assistant—sometimes experienced, more often not. The great seasonal fluctuation in numbers banded does not always indicate a corresponding difference in the numbers of young available. It has usually been possible to make only one trip in a season, and at times the weather has not been favorable until the season was too far advanced. In some years it was necessary to leave the colony after only a few hours because of weather conditions. In 1936, however, when only 259 were banded, there were few if any more available. This was a very poor season not only for gulls, but for the other species on the rock, and, I believe, for other colonies in this region as well.

In passing, a word is in order regarding the behavior of the gulls toward their neighbors as I have observed it in this colony, and at Cape Lookout, Oregon, in a large murre colony, where a few gulls were banded in 1930. Most, if not all, of the earlier writers on Western Gulls speak of the wholesale destruction of eggs and young of other species by them. Bent (U. S. Nat. Mus. Bull., 113, 1921, p. 97) quotes Mr. A. W. Anthony, as late as 1906, in this connection, as saying that whole colonies of young cormorants were practically wiped out by the gulls. Although there can be no doubt as to the accuracy of these observations, they certainly do not apply to the colonies on Haystack and at Cape

Fig. 50. Haystack Rock, Pacific City, Oregon, from the south.

Lookout. At the latter place I have spent hours on several occasions in a densely populated murre colony, and have only a few times seen eggs or young taken, although the murres were more or less constantly disturbed by our movements among them. Gulls were constantly cruising back and forth above the ledges. Once I saw one seize a young murre from a ledge, but on only three other occasions that I can recall were young attacked even after they had tumbled from the ledge to the rocks or the water 40 feet or so below. Scarcely any destruction of eggs was noted on the two occasions when I visited Cape Lookout in June at the beginning of the breeding season.

On the trip to this colony made on July 31, 1937, a dozen or more young murres were found with their heads eaten. That this was the work of gulls is probable, but the fact that several adult murre and gull bodies and a quantity of empty .22 shells were also found seems to indicate that the young might first have been killed by vandals who had visited the colony about a week before we did. On the other side of the picture, one broken murre's egg and another headless young murre were found beside a recently abandoned gull's nest. This was the only direct evidence against the gulls seen that year, the young gulls being at that time large enough to fly.

On Haystack Rock the cormorants, almost without exception, leave their nests when we are still at some distance from their part of the colony and do not return until we are well out of sight around a shoulder of the rock. Yet I have never seen a set of eggs disturbed, or a young cormorant eaten, although I did see two rather large young that had ventured out to the edge of a ledge, away from the nest, knocked off by the gulls. I am at a loss to explain this apparent discrepancy in conduct except on the ground that the repeated visits of eggers to some of the better known colonies in early years taught the gulls to take advantage of their defenseless neighbors. In any case, their depredations are a negligible factor in these two Oregon colonies, and in one off Cascade Head frequently visited by Mr. Alex Walker in recent years.

Fig. 51. Young Western Gulls at Haystack Rock.

The principal food of the young gulls on Haystack Rock would seem to be small fish, crustaceans and cephalopods. I have seen no evidence of cannibalism among the older gulls, although I have often seen young gulls that had been attacked and so badly beaten about the head that they probably died. Several times I have found young that had been killed outright. It is my belief that this is due either to the efforts of the parents to drive bewildered young back to their own territory, or to resentment on the part of other adults at the invasion of their nesting territory by wandering young. If this is the case, their efforts are signally unsuccessful, as there are few things more stubborn than a young gull which has made up its mind to go away from the part of the colony which is being disturbed.

Following my earlier experiences at the Lookout and Haystack colonies, I have had the opportunity to visit the south rock of the Three Arch Rock Bird Refuge, near Cape Meares, Oregon, on July 3, 1938, and on July 14, 1939. The bad habits of the gulls in this mixed colony of murres, cormorants and gulls can scarcely be exaggerated. No sooner were the murres frightened from the small defenseless young and from eggs that were nearly ready to hatch than the gulls were among them, pillaging right and left. Among the almost countless thousands of young murres on the rock the percentage of loss was probably not great, but certainly considerable numbers of young were killed and eaten, and dozens, at least, of eggs broken, no doubt to be eaten later by the gulls. I saw old gulls swallow fairly large-sized young murres with considerable difficulty, head first, the youngster still kicking in protest as its feet disappeared down the gull's capacious maw.

Apparently the gulls at this time of year preferred young murres to cormorants, for although the Brandt Cormorants in a fairly large colony (perhaps 100 nests) on the north slope of this rock left more readily and stayed away longer than did the murres, we saw no evidence that the gulls had disturbed either eggs or young of this species

Fig. 52. Young Western Gull after banding at Haystack Rock.

while we were on the rock. However, we did note a great discrepancy in the size of young in the same nest, which might indicate some stealing of eggs earlier, and we also found fresh eggs, and nests under construction, in a colony where some of the young were as much as one-half grown. Whether this irregularity of nesting time is due to persecution by the gulls, or is characteristic of the species, I do not know.

To return to the banding of gulls on Haystack Rock, the numbers banded in the eight seasons and the returns are shown in the following table. It has seemed best not to include in the present paper the results of the seasons of 1938 and 1939, partly because comparatively few returns have been received as yet, but more because most of the birds banded in the last two years have been marked with colored bands in co-operation with the new coast-wide gull-banding project of the Western Bird Banding Association. The use of different combinations of color for each colony, and for each year, inaugurates a new technique in colony banding that should help solve many of the questions left unanswered by the data gathered previously. The ultimate success of this project will depend largely on the number of trained observers all along the coast who will make a point of checking periodically on the banded gulls seen in their own neighborhoods. Concentrations of gulls along the waterfront near fish-docks, canneries, and garbage dumps should provide particularly good opportunities for such observations.

TABLE 1

Western Gulls banded at Haystack Rock

Year	Number banded	Number of returns	Percentages	Adult returns
1930	6	—	—	—
1931	240	22	7.1	8
1932	164	14	8.5	2
1933	366	35	9.5	4
1934	475	38	8.0	3
1935	601	44	7.3	2
1936	259	25	9.6	—
1937	563	48	8.5	—
Totals	2674	226	(average, 8.41)	19

In tabulating adult returns I have followed the assumption of Bent (*op. cit.*, p. 95) that the normal, vigorous Western Gull acquires a fully adult plumage at the third nuptial molt, when approximately three years old, and might reasonably be expected to breed in that year. However, I have as yet no direct evidence from banding records that this is the case, and as this view is not accepted by all authorities, it should be noted that some of the returns listed in detail in table 2 and on the map as "adult" are open to question. Dwight, in his monograph "The Gulls of the World" (Bull. Amer. Mus. Nat. Hist., vol. 52, 1925, p. 217), says that *Larus occidentalis* has a four-year plumage cycle, acquiring the fully adult breeding plumage at the fourth nuptial molt. The recovery of two individuals nearly three years old, in April and May, outside the breeding range of the species might tend to confirm this view.

Returns are, of course, much more numerous for birds less than one year old, and it would be premature to attempt to outline the movements of adults on the basis of data so far accumulated. Returns of birds of the year range from Seymore Inlet, British Columbia, to San Pedro, California, and at all seasons, with nearly as many from the north as from the south. Allowing for the fact that there are probably more potential observers who would be apt to notice and report banded gulls in California than in Washington and British Columbia, it would seem that the movement of young birds is in fact, as earlier observations have indicated, a simple dispersal along the coast in both directions. That some of the young remain in the vicinity of the parent colony at least through the first winter is indicated by returns from Nestucca and Tillamook bays, Oregon, in every month from July of the year of banding to February of the year following, and one each in April, July, August, and October of the succeeding year.

A fur farmer at Pacific City told me of a gull which fed regularly at his mink pens until mid-December, when he killed it. He did not save the band or record the number, but the bird was undoubtedly a young of the year. A return card from Newport, Oregon, January 28, 1935, referring to a bird banded in July, 1933, speaks of it as being "very tame—comes for food every day. Has been coming all winter." These instances would tend to confirm, for this species also, the suggestion of Sprot (Condor, vol. 39, 1937, p. 238) with regard to Glaucous-winged Gulls, that individuals may tend to become resident in winter in some particular locality where they find food plentiful. Of three birds of the year trapped and banded at Cape Kiwanda, Oregon, September 17, 1936, one was found dead on the beach about two miles south of this point November 27, 1936. And finally, of three adults trapped and banded on the Nestucca River, at Beaver, in December, 1930, and January, 1931, one was killed in January, 1932, at the mouth of the same river, about twelve miles from Beaver. It is perhaps significant that the extreme returns, from Seymore Inlet, British Columbia, and San Pedro, California, are both for birds in their first winter, tending to confirm the theory that individuals do not usually wander farther afield than they have done in the course of their first year.

Although the returns actually recorded of adults are too few to offer any conclusive evidence, they seem to indicate a tendency of adults to return to the general region of nativity during the breeding season, but not necessarily to the original colony. There are so far nineteen records of birds three years old or more, eighteen of them from Oregon and Washington. Eight are spring and early summer records and all but three of these are from within 120 miles of the original colony. One, a November return, is from Carquinez Straits, California, this being the farthest removed of any of the adult returns. Two of the spring returns outside the 120-mile radius are records of a single bird, banded in July, 1931, and caught by two different individuals on Puget Sound, one near Bremerton, Washington, and the other about twelve miles away, at Bellfair. These, of course, are outside the breeding range of the species. In addition, one recovery from Seattle, Washington, was of a bird nearly three years old. Until 1938, no banded adults were seen in the Haystack colony, but the aluminum band that has been worn three years or more is not very conspicuous. In 1938 at least three banded adults were seen in the colony, and three or four (possibly the same birds) on the beach near it. In 1939 also, three, and possibly more, banded adults were seen. An attempt to trap one of these was unsuccessful.

Griffing Bancroft (Condor, vol. 29, 1927, p. 189) makes the statement that "egg types show that Western Gulls are strongly inclined to remain to breed in the colonies in which they were hatched." While it is, of course, quite possible that the adults captured or found dead during the breeding season near other colonies are non-breeding birds, these returns, together with the small number of adults so far actually seen wearing bands in the Haystack colony, seem to me to throw some doubt on this conclusion. Allowing for 80 per cent mortality, which would seem to be a rather high estimate, there should have been by the time of the 1939 season at least 400 live banded Western Gulls of breeding age in the Haystack colony. I am confident that no very large fraction of that number actually returned to the colony. Color banding should give us a much more accurate idea, in time, of the numbers of birds returning to the original colony to breed and also of the seasonal movements of adults.

TABLE 2

Detailed returns of adult Western Gulls

Banded	Age	Band number	Recovered	Date	Age
July, 1931	jv.	B616448	Bremerton, Wash.	May 1, 1934	—3 yr.
		B616448	Bellfair, Wash.	May 3, 1934	
		B616453	Aberdeen, Wash.	May 6, 1934	—3 yr.
		B616566	Beaver, Ore.	Feb. 10, 1936	4 yr.
		B616570	Marshfield, Ore.	Aug. 29, 1937	6 yr.
		B616529	Cannon Beach, Ore.	Aug. 30, 1937	6 yr.
		B616476	Longview, Wash.	Mar. 28, 1938	7 yr.
Jan., 1931	ad.	A696729	Nestucca River (less than 10 mi. from place of banding)	Jan. 12, 1932	ad.
July, 1932	jv.	B616708	Rainier, Ore.	Feb. 24, 1936	4 yr.
		B667040	Kernville, Ore.	May 1, 1938	6 yr.
July, 1933	jv.	B667114	Waldport, Ore.	Nov. 11, 1936	3 yr.
		B689160	De Lake, Ore.	June 27, 1937	4 yr.
		B667246	Hoquiam, Wash.	Mar. 4, 1937	— 4 yr.
		B667142	Carquinez Sts., Calif.	Nov. 23, 1937	4 yr.
July, 1934	jv.	B646480	De Poe Bay, Ore.	Jan. 6, 1938	3 yr.
		B646450	Bradwood, Ore.	Jan. 21, 1938	3 yr.
		34-379489	Seattle, Wash.	Apr. 17, 1937	—3 yr.
July, 1935	jv.	34-657349	Columbia River Lightship, Ore.	Dec. 19, 1938	3 yr.
		34-628499	South Bend, Wash.	Aug. 20, 1938	3 yr.

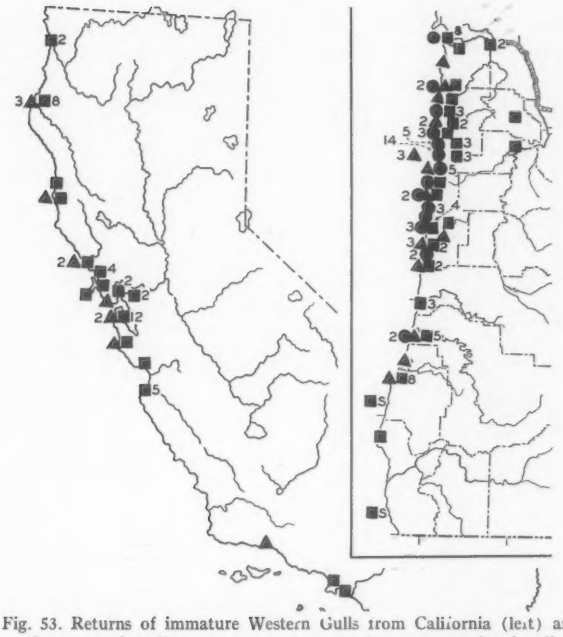

Fig. 53. Returns of immature Western Gulls from California (left) and Oregon (right). Dots represent returns in first summer after banding; squares, returns in fall and winter; triangles, returns in following spring and summer. S, denotes offshore returns. Numbers indicate individuals at locality marked by symbol.

Of the total of 226 returns, 43 are for young birds recovered in the first three months after banding, all within 120 miles of the colony, and about equally distributed north and south. Of the remainder, 41 are spring and summer returns, from April to September, 9 of them being adult. Of the 141 fall and winter returns, October to March, 10 are adults. It would seem, as might be expected, that the mortality of immature birds is much higher in the winter, being greatest in the first winter. This does not seem to be true of adults, if one may judge from the small number of adult returns so far received. By far the heaviest mortality in the first year is in November, December, and January, months when one would expect that a smaller percentage of birds would be found and reported. Not all of these returns are for dead birds, but the great majority of them are. Occasionally one is caught on a fish line or captured in some other way and released alive.

TABLE 3

Returns grouped according to ages

Year of banding	Under 10 mo.	10 mo. -2 yr.	2-3 yr.	3-4 yr.	4-5 yr.	5-6 yr.	6-7 yr.
1931	10	2	2	4	1	—	3
1932	6	6	—	1	—	1	—
1933	24	4	3	2	2	—	—
1934	24	9	1	3	—	—	—
1935	29	9	4	2	—	—	—
1936	18	4	3	—	—	—	—
1937	38	10	—	—	—	—	—
Totals	149	44	13	12	3	1	3

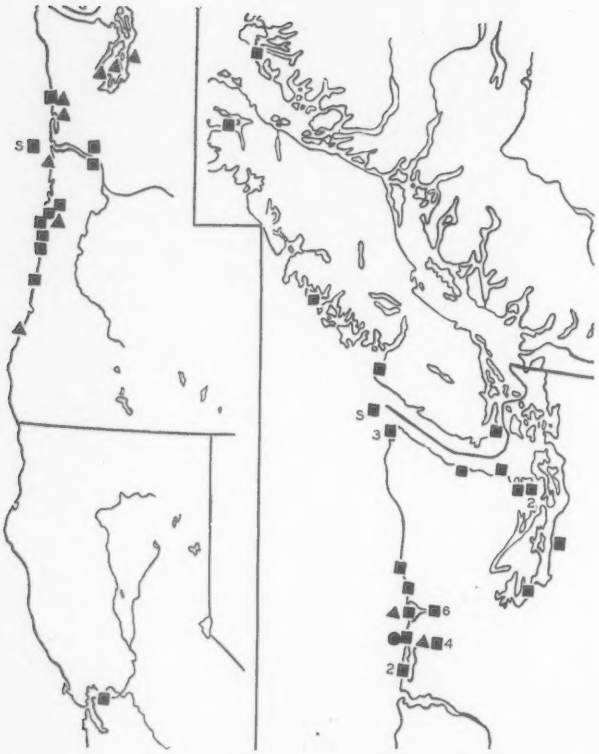

Fig. 54. Returns of Western Gulls. Left, adults from Washington, Oregon and California. Squares represent winter returns; triangles summer returns. Right, immatures from British Columbia and Washington. Symbols as in figure 53.

Another point of common observation that is further confirmed by a glance at the maps (figs. 53 and 54) is that *Larus occidentalis* is strictly a bird of the bays and beaches. Only two returns have been received from points far removed from salt water —one from Dundee, Oregon, and one from Cornelius, Oregon. These are not far from the Willamette River, Dundee being about 45 miles from its confluence with the Columbia, and Cornelius near the Tualatin River, a small tributary of the Willamette nearer the Columbia. It seems likely, in view of the reluctance of these gulls to follow rivers far inland elsewhere, that the Willamette River returns and possibly those from Puget Sound also, are due largely to the habit of following coast-wise shipping. The four offshore returns from steamers and light-ships may be explained in similar fashion.

SUMMARY

The results of seven years banding of juvenal Western Gulls, *Larus occidentalis occidentalis*, using numbered bands only, seem to show that dispersal is general and

nearly equal in numbers north and south from a breeding colony located on the Oregon coast somewhat north of the center of the breeding range of the race.

Only rarely do these gulls leave the vicinity of salt water, except along fairly large navigable rivers.

Adults probably return to the general region, but not necessarily to the colony, in which they were hatched, when of breeding age.

The heaviest mortality, and also the widest dispersal, occurs during the first winter after hatching.

There is at least an indication that individuals tend to become resident during the years of immaturity, in the locality in which they settle in their first winter.

Beaver, Oregon, November 13, 1939.

FOOD HABITS OF THE NORTHERN BALD EAGLE IN THE ALEUTIAN ISLANDS, ALASKA

By OLAUS J. MURIE

Two Biological Survey expeditions to the Aleutian Islands in 1936 and 1937, offered excellent opportunities for observations on the Northern Bald Eagle, *Haliaeetus leucocephalus alascanus*, which is common throughout that chain of islands. In view of the interest in the status of the Bald Eagle in Alaska, it seems appropriate to record our findings.

An extensive faunal survey of the Aleutians was made to form the basis of management plans for the Aleutian Islands Wildlife Refuge, administered by the Biological Survey. A good seaworthy ship, the *U.S.M.S. Brown Bear*, was placed at our disposal, and this made possible a thorough exploration of those interesting islands. In 1936, Cecil Williams and I made up the scientific party, and we were assisted by Douglas Gray and Homer Jewell of the Alaska Game Commission. In 1937, I was accompanied by Dr. Victor B. Scheffer, John H. Steenis, and Douglas Gray, who again represented the Alaska Game Commission.

Since our program was rather comprehensive, we could not devote the time we should have liked to the Bald Eagle, but enough data were obtained on its food habits during the nesting season to be significant. When a nest was visited, all food debris was collected. In 1936, ten nests or nesting sites were inspected and food materials listed. Some of these were on Amak Island, just north of the western tip of the Alaska Peninsula, and on Sankin Island, near False Pass; others were to the west. These nests were well distributed throughout the chain of islands. In 1937, eighteen nests were studied. Thus in the two years, 28 nests of the Northern Bald Eagle were examined and a total of 399 food items listed. Many other nests were seen, but there was not sufficient time to examine them.

Easily identified food items were simply listed on the spot. The remainder were taken to the ship, where further identifications could be made by comparison with specimens collected in the course of the trip. The material most difficult to determine was saved for study in the laboratory. Items of this kind from the first expedition were examined in Washington, D.C., by Cecil Williams, and those from the 1937 expedition were examined at my field headquarters at Jackson, Wyoming.

In the two following tables are listed the food remains and pellets found in Bald Eagle nests in 1936 and 1937, respectively. Percentages are based on numbers of individuals rather than volume, as the latter method is not applicable to this kind of material. (The first table includes material from two localities where we did not have time to locate the nests themselves, but substantial collections of pellets and food remains warrant their being listed as nests.)

FOOD ITEMS IN BALD EAGLE NESTS, 1936

Item	Total number of individuals	Per-centage	Number of nests in which found	Greatest number in one nest
Birds				
Shearwater, *Puffinus*	6	8.1	4	2
Fulmar, *Fulmarus glacialis*	5	6.7	3	3
Forked-tailed Petrel, *Oceanodroma furcata*	1	1.3	1	1
Cormorant, *Phalacrocorax*	2	2.7	2	1
Duck	1	1.3	1	1
Harlequin Duck, *Histrionicus histrionicus*	2	2.7	2	1
Pacific Eider, *Somateria v-nigra* (female)	1	1.3	1	1
Glaucous-winged Gull, *Larus glaucescens*	2	2.7	1	2
Kittiwake, *Rissa tridactyla*	1	1.3	1	1
Murres, *Uria aalge, U. lomvia*	12	16.2	1	12

Item	Total number of individuals	Percentage	Number of nests in which found	Greatest number in one nest
Birds				
Pigeon Guillemot, *Cepphus columba*	2	2.7	2	1
Ancient Murrelet, *Synthliboramphus antiquus*	1	1.3	1	1
Paroquet Auklet, *Cyclorrhynchus psittacula*	2	2.7	1	2
Crested Auklet, *Aethia cristatella*	3	4.0	2	2
Tufted Puffin, *Lunda cirrhata*	1	1.3	1	1
Undetermined alcid	1	1.3	1	1
Undetermined bird	1	1.3	1	1
	44	58.9		
Mammals				
Domestic Sheep	1	1.3	1	1
Field Mouse, *Microtus amakensis*	3	4.0	1	3
	4	5.3		
Fishes				
Atka Mackerel, *Pleurogrammus monopterygius*	5	6.7	1	5
Cottids	6	8.1	2	4
Undetermined fish	3	4.0	3	1
	14	18.8		
Invertebrates				
Squid	1	1.3	1	1
Snails	6	8.1	4	3
Crab	4	5.4	2	3
Nereid (mandibles)	1	1.3	1	1
	12	16.1		
	74			

FOOD ITEMS IN BALD EAGLE NESTS, 1937

Birds				
Shearwater, *Puffinus (tenuirostris?)*	13	3.9	9	3
Fulmar, *Fulmarus glacialis*	74	22.6	15	20
Cormorant (probably *Phalacrocorax pelagicus*)	20	6.1	10	6
Emperor Goose, *Philacte canagica*	2	.6	2	1
Duck	1	.3	1	1
Pintail, *Dafila acuta*	1	.3	1	1
Teal (probably *Nettion crecca*)	1	.3	1	1
Old-squaw, *Clangula hyemalis*	10	3.1	5	3
Harlequin Duck, *Histrionicus histrionicus*	1	.3	1	1
Pacific Eider, *Somateria v-nigra*	4	1.2	4	1
Red-breasted Merganser, *Mergus serrator*	1	.3	1	1
Bald Eagle, *Haliaeetus leucocephalus* (nestling)	1	.3	1	1
Ptarmigan, *Lagopus rupestris*	1	.3	1	1
Glaucous Gull, *Larus hyperboreus*	2	.6	1	2
Glaucous-winged Gull, *Larus glaucescens*	27	8.3	12	6
Kittiwake, *Rissa tridactyla*	2	.6	1	2
Murres, *Uria aalge, U. lomvia*	22	6.7	9	12
Pigeon Guillemot, *Cepphus columba*	4	1.2	3	2
Ancient Murrelet, *Synthliboramphus antiquus*	9	2.8	6	4
Paroquet Auklet, *Cyclorrhynchus psittacula*	8	2.4	5	3
Crested Auklet, *Aethia cristatella*	37	11.3	13	11
Least Auklet, *Aethia pusilla*	3	.9	2	2
Horned Puffin, *Fratercula corniculata*	13	4.6	7	7
Tufted Puffin, *Lunda cirrhata*	21	6.4	9	5
Raven, *Corvus corax*	2	.6	2	1
	280	86.0		

Item	Total number of individuals	Percentage	Number of nests in which found	Greatest number in one nest
Mammals				
Blue Fox, *Alopex* sp.	1	.3	1	1
Aleutian Ground Squirrel, *Citellus p. ablusus*	22	6.7	3	14
House Rat, *Rattus norvegicus*	1	.3	1	1
Domestic Sheep	1	.3	1	1
	25	7.6		
Fishes				
Plagyodes sp.	4	1.2	4	1
Greenling, *Hexagrammos* sp.	4	1.2	3	2
Atka Mackerel, *Pleurogrammus monopterygius*	9	2.8	6	4
Alaska Cod, *Gadus macrocephalus*	1	.3	1	1
Sculpin (Cottidae)	1	.3	1	1
Dolly Varden Trout, *Salvelinus malma*	1	.3	1	1
	20	6.1		
	325			

These data concerning the 399 food items taken in two seasons from 28 nests, distributed at regular intervals throughout the entire chain of islands, should be representative and significant.

Birds.—It will be noted that birds constitute the major part of the Bald Eagle's diet, amounting to 86.0 per cent in 1937, although in 1936 they formed only 58.9 per cent. The lower percentage recorded for 1936 was no doubt caused by the fact that the data for that year were obtained to a greater degree from pellets, which revealed more invertebrate items than would be found in direct nest examination, and as these were listed on a par with others, the percentage of birds would be correspondingly lowered. Furthermore, these invertebrates were recorded only from nests on Unimak and Amak islands, where there are extensive beaches, and where such items may more readily be picked up by the eagles. It is likely that the material obtained in 1937, consisting of 325 items, is somewhat more representative of the Bald Eagle's diet in the Aleutian Islands as a whole.

Certain it is that birds are the chief food, and this would be expected in view of their supremacy in the fauna of the Aleutian Islands. It is significant also that the eagles prey extensively on so-called sea birds, which are the most plentiful there, the most numerous ones in the 1937 material being shearwaters, fulmars, cormorants, Glaucous-winged Gulls, murres, Ancient Murrelets, Paroquet Auklets, Crested Auklets, and Horned and Tufted puffins. Fulmars lead the list, though shearwaters also are taken often. Numerous auklets are captured, and cormorants and Glaucous-winged Gulls pay a fairly heavy toll to the eagle.

Undoubtedly some of these birds are taken as carrion. Fly pupa cases were found in some of the samples. But in numerous instances the plumage of the bird remains was fresh and showed no evidence of having rolled on the beach. It would seem that the eagle is capable of capturing various species, including the abundant fulmars and gulls, as well as the fast-flying auklets. The lumbering cormorant should be easy prey.

It is noticeable that few ducks were taken. A probable reason for this is the great abundance of sea birds, which thus act as buffers. Among the ducks, Old-squaws seemed to fall prey most readily, though they were present in only a few localities.

Mammals.—The percentage of mammals in the diet requires explanation. Small rodents are not available on most of the islands. Ground squirrels have been introduced on Kavalga Island for fox food, and the eagles apparently take full advantage of that

supply. These rodents are not available on the other islands where nests were examined, except on Unimak Island. House rats are common on Rat Island. Probably on only three other islands could these be found by eagles.

Domestic sheep wool was found in one nest near Umnak Island, where a large herd of sheep is kept.

It is known that eagles will feed on stranded whales and seals, but such items did not appear in the nests.

Fishes.—The Bald Eagle's appetite for fish is well known, and the percentage of such remains found in the material studied would seem to be low. Probably many of the fishes are found as carrion on the beaches. This would seem to be necessary in the case of cod as well as of *Plagyodes*. We found the latter washed up on the beach on several occasions.

At times fishes were seen at the surface of the water under circumstances that would permit capture by an eagle. This was particularly true of the Atka mackerel. Whether sculpins or greenlings can be picked up in shallow waters is not known. They may be available occasionally in tide pools.

ECONOMIC STATUS OF THE EAGLE

For a number of years Alaska has paid a one-dollar bounty on eagles. A few persons in southeastern Alaska have made eagle hunting a commercial, part-time project. Eagle claws serve, in a measure, as legal tender. A store in Kodiak displayed a sign, "Eagle Feet Bought Here." Certain natives had taken very young birds in the nest and were raising them, temporarily as pets, but eventually to be turned in for the bounty.

Such universal application of an eagle bounty is the result of the general opinion that the eagle is harmful to man's interests, and this opinion must surely rest on a number of direct observations. The obvious sincerity of certain informants, both white men and natives, could leave no doubt that they had seen good evidence of eagle depredations. But when they were questioned on the extent of such depredations, the information became uncertain. Here lies the crux of the eagle question. There are many good single observations. But there has been little if any quantitative study, and we have had little basis for evaluation.

The present data apply only to the Aleutian chain. We had no opportunity to work on eagles east of the end of the Alaska Peninsula, least of all in southeastern Alaska, where such study is most needed. Our studies appear ample for an evaluation of the eagle's status in the Aleutian Islands, at least through the spring and summer.

The eagle has been charged with undue destruction of salmon. In the Aleutians as a whole the salmon, although present in moderate numbers, are not conspicuous in the fauna and not available on a large scale. Therefore, that problem does not arise except in the vicinity of False Pass, at the extreme east end of the group of islands. Special work, for which we lacked the necessary time, would be desirable there.

Domestic sheep wool was found once each year in a single nest near Umnak Island. The man in charge there had no complaints against the eagle, and I could learn of no actual depredations. Sheep are not present west of Umnak Island.

Depredation on blue foxes has been charged to the eagle, and this was cited by many with whom we talked. Here is a problem particularly applicable to the Aleutian Islands, since most of the islands have been leased for raising foxes. The blue foxes run wild, forage for themselves, and are usually trapped at two or three-year intervals. They would seem to be vulnerable to eagle attack, living as they do on the beaches of treeless islands. Also, Aleut natives told us that eagles do take young foxes. Accordingly we gave special attention to the eagle-fox relationship.

Although most of the eagle nests examined were on islands occupied by foxes, we found a fox pup in only one nest, on Rat Island. On a percentage basis this is .3 per cent of the eagle diet, and even this possibly is carrion.

On Amchitka Island, within 200 yards of an eagle's nest containing no fox remains, a family of young foxes was living unmolested. There was another fox family at a somewhat greater distance in the opposite direction. Foxes were seen on the beach within easy reach of eagles on Kavalga Island. Many such instances could be cited. In fact, on Rat Island, where the young fox was found in the eagle's nest, there were two other nests with no trace of fox fur, and foxes were plentiful within easy reach of all of these.

Several dead foxes had been found on the beaches, and it is probable that eagles would find some of these, though they should be capable of catching live ones also. At any rate, the evidence shows that eagles are not a serious menace to the blue foxes in the Aleutian Islands. An excellent fur crop is generally harvested on islands with suitable productive beaches.

There were some reports among the natives that eagles kill young sea otters. I can believe that natives have actually seen sea otter remains in eagle nests. Their accounts were convincing. But when questioned on *how many* had ever been found thus, their replies were vague, and they could give no satisfactory information. We found no trace of the sea otter in nests or pellets, though we did find sea otter fur in a few blue fox droppings. We also found several adult sea otter skeletons from which the flesh had been eaten by eagles or foxes or both. These no doubt had been carrion. The natives themselves occasionally find a baby sea otter on the beach that has been a victim of the surf or has died from some other natural cause. Eagles also must find some of these. It is well known that sea otter carcasses are occasionally washed up on the beach.

The sea birds on which the Bald Eagles feed so extensively are sufficiently numerous to withstand the drain occasioned by a few pairs of eagles on any given island. Clashes with man's economic interests occur so seldom and on so small a scale that they are negligible. Therefore, in the Aleutian Islands at least, the food habits of the Northern Bald Eagle are harmless so far as man's commercial interests are concerned.

Bureau of Biological Survey, Jackson, Wyoming, February 19, 1940.

FREQUENCY OF OCCURRENCE OF BIRDS ON THE BERKELEY CAMPUS, UNIVERSITY OF CALIFORNIA

WITH THREE GRAPHS

By THOMAS L. RODGERS and CHARLES G. SIBLEY

Daily species lists gathered over a period of time in a restricted locality can be utilized in making a useful analysis of the bird population of the area. It has been shown that species lists so gathered are comparable to sample plots, of ecologists, and that data derived from a large number of them usually conform with Raunkiaer's Law of Frequence (Linsdale, Condor, vol. 30, 1928, pp. 180-184). This has proved to be an especially useful type of analysis when it is desired to compare the frequency of occurrence of birds of one area with their frequency of occurrence on another. This has been pointed out by Linsdale (Condor, vol. 34, pp. 221-226, and Wilson Bull., vol. 48, 1936, pp. 158-163) and Linsdale and Rodgers (Condor, vol. 39, 1937, pp. 108-111).

Lists of species gathered on the Berkeley campus of the University of California further serve to demonstrate the usefulness of such data. It is also expected that this analysis will be helpful to students becoming acquainted with the birds of the area.

The Berkeley campus of the University of California is in the eastern edge of the city of Berkeley, at the mouth of Strawberry Canyon. It is two and one-quarter miles from the eastern shore of San Francisco Bay, about opposite the Golden Gate. The area on which this study was made is the western end of the campus, west of the Campanile, between Hearst Avenue on the north and Allston Way on the south. It covers about 85 acres. There are eleven large buildings on the area, yet there are extensive lawns over which are scattered large trees. There is shrubbery around the buildings, and trees and shrubbery line some of the roadways. The north and south branches of Strawberry Creek flow into the area from the northeast and southeast and unite in a grove of 105 tall eucalyptus trees near the southwest corner of the area. South of this are 30 tall Monterey pines. The creeks are usually dry by August or September, and remain so for one to three months. They are lined with shrubbery, much of it native, which is allowed to form thick tangles in many places. Along the north fork of Strawberry Creek, about 200 yards from where it enters the area, there is a grove of 21 redwood trees, and extending east from this is a vale that is not planted in lawn and is covered with deciduous trees. To the northeast, and along the south edge of this vale are scattered large trees (eucalyptus, Monterey pine and Monterey cypress). In the northwestern corner of the area and midway along the south border are two more areas (4 and 1 acres respectively) that are not planted in lawn, but on which there are no trees.

Though the area is 13 miles from the actual ocean coast, it does not have the extremes of temperature typical of the inner coast range valleys, and being back from the immediate coast, it is not subject to constant winds typical of the coast. The Bay has a moderating effect on the climate. Average temperatures are about 62.5 degrees in summer and 50.2 degrees in winter, and temperatures as high as 85 degrees are of infrequent occurrence and brief duration. The lowest temperature recorded within the last 40 years was 24.9 degrees. The annual rainfall is 25.13 inches, of which about three-fourths comes in the four months, December to March, inclusive. In this period rain falls approximately one day out of three. There is seldom any rain in June, July, or August. There are about 100 days a year in which the sky is overcast for more than half of the daylight hours.

The data for this analysis consist of 120 lists of species, 10 for each month of the year. They were gathered by the authors over a period of two years (1938, 1939). The

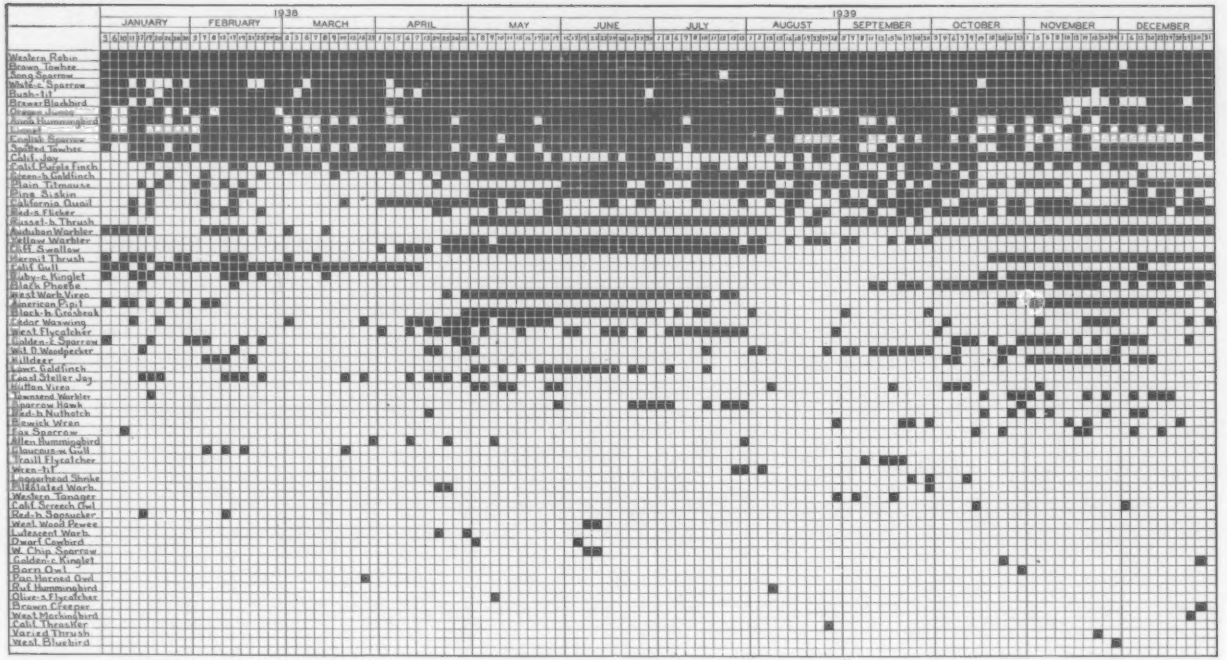

Fig. 55. Days (marked in black) on which each species was recorded.

lists were made at different times of day. In fact, they represent almost all hours of the day. The majority of them were made on a plan much as follows. An indirect approach to the Life Sciences Building was made some time between 7:30 and 8:30 in the morning. A 20 to 30 minute walk around the campus at noon and occasional walks between the buildings were taken, and some species were usually listed when seen or heard from class or office windows. Between 4:30 and 7:30 in the afternoon, an indirect

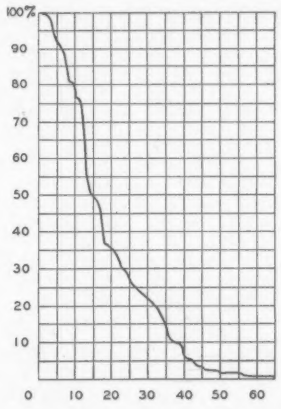

Fig. 56. Relative frequency of the 65 kinds of birds.

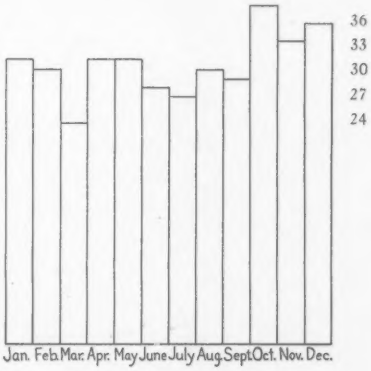

Fig. 57. Number of species observed each month.

route from the Life Sciences Building across the campus and out the north, west, or south entrances of the campus usually completed the observations for the day. Because of the casual way in which the lists were made, it is difficult to judge the time spent on each. No list was used unless it was made on the basis of visits to all major parts of the area described, and unless at least one hour was spent by one or both of the observers. The time spent in making each list probably averages nearly two hours.

In the list which follows, the per cent of frequency was computed for each bird by dividing the number of days that the bird was recorded by the total number of days of observation. This (and figure 56) gives relative frequency of the species in terms comparable with similar rankings of the species of other localities. The number of species seen on the area each month is shown by figure 57. In all, 65 species were recorded.

	Name	Per cent of times recorded		Name	Per cent of times recorded
1.	Western Robin	100.0	13.	California Purple Finch	55.0
2.	Brown Towhee	99.6	14.	Green-backed Goldfinch	50.0
3.	Song Sparrow	98.5	15.	Plain Titmouse	49.2
4.	White-crowned Sparrow	93.5	16.	Pine Siskin	48.3
5.	Bush-tit	92.5	17.	California Quail	46.7
6.	Brewer Blackbird	91.0	18.	Red-shafted Flicker	36.7
7.	Oregon Junco	88.2	19.	Russet-backed Thrush	36.7
8.	Anna Hummingbird	80.8	20.	Audubon Warbler	36.7
9.	Linnet	80.8	21.	Yellow Warbler	35.0
10.	English Sparrow	76.8	22.	Cliff Swallow	33.4
11.	Spotted Towhee	76.8	23.	Hermit Thrush	30.1
12.	California Jay	74.2	24.	California Gull	29.1

	Name	Per cent of times recorded
25.	Ruby-crowned Kinglet	27.5
26.	Black Phoebe	25.8
27.	Western Warbling Vireo	25.0
28.	American Pipit	24.2
29.	Black-headed Grosbeak	23.3
30.	Cedar Waxwing	22.5
31.	Western Flycatcher	21.7
32.	Golden-crowned Sparrow	20.8
33.	Willow Downy Woodpecker	19.4
34.	Killdeer	16.7
35.	Lawrence Goldfinch	14.4
36.	Coast Steller Jay	11.7
37.	Hutton Vireo	10.0
38.	Townsend Warbler	10.0
39.	Sparrow Hawk	9.2
40.	Red-breasted Nuthatch	6.7
41.	Bewick Wren	5.8
42.	Fox Sparrow	5.8
43.	Allen Hummingbird	4.2
44.	Glaucous-winged Gull	3.3
45.	Traill Flycatcher	3.3
46.	Wren-tit	2.5
47.	Loggerhead Shrike	2.5
48.	Pileolated Warbler	2.5
49.	Western Tanager	2.5
50.	California Screech Owl	1.7
51.	Red-breasted Sapsucker	1.7
52.	Western Wood Pewee	1.7
53.	Lutescent Warbler	1.7
54.	Dwarf Cowbird	1.7
55.	Western Chipping Sparrow	1.7
56.	Golden-crowned Kinglet	1.7
57.	Barn Owl	.8
58.	Pacific Horned Owl	.8
59.	Rufous Hummingbird	.8
60.	Olive-sided Flycatcher	.8
61.	Brown Creeper	.8
62.	Western Mockingbird	.8
63.	California Thrasher	.8
64.	Varied Thrush	.8
65.	Western Bluebird	.8

When the species listed above are assigned to five classes of frequency (A, 1-20 per cent; B, 21-40 per cent; C, 41-60 per cent; D, 61-80 per cent; E, 81-100 per cent), the numbers of species in these classes are 34, 14, 5, 5, 7, respectively. The percentages of species in each group in the whole list recorded for the area are 52, 21, 8, 8, and 11, respectively. Thus, the distribution of species among the classes of frequency is remarkably like that revealed in similar surveys of other localities, and since $A>B>C=D<E$, the distribution is consistent with Raunkiaer's Law of Frequence ($A>B>C=D<E$).

From the evidence presented in the chart (figure 55) it appears that the Black Phoebe is a winter visitant. Actually it is a common resident in the Bay area. It is present on the study area only in winter; the birds breed in Strawberry Canyon and stray to the lower campus only rarely in the breeding season. This is in accordance with the findings of Oberlander (Condor, vol. 41, 1939, pp. 133-151). The occurrence of the Steller Jay is similar to that of the phoebe in that the birds come to the lower campus only in winter.

Museum of Vertebrate Zoology, Berkeley, California, February 25, 1940.

RHYTHM IN THE BROODING AND FEEDING ROUTINE OF THE BLACK-CHINNED HUMMINGBIRD

WITH ONE ILLUSTRATION

By FRANK BENE

Investigations in the field of bird behavior have disclosed the seasonal rhythm of the reproductive processes, but the rhythmic nature of daily activities during the reproductive period has received relatively less attention. In this paper an attempt is made to inquire into the rhythm of the brooding and feeding routine as practiced by a Black-chinned Hummingbird (*Archilochus alexandri*) under my observation at Phoenix, Arizona, in the spring of 1939.

It is generally established that the component activities of the reproductive cycle—mating, nest-building, egg-laying, incubating—are governed by endocrine secretions and are associated, one setting off the next in sequence in cyclical order and according to season, so that the total of these processes forms a rhythmic whole. As seasonal changes and climate influence the rhythm of the reproductive cycle, so meteorological conditions affect the rhythm of the brooding routine. The overt behavior observed in the brooding routine is not called into action merely by glandular secretions or internal physiological stimuli. It is not these alone that send the adult bird to her nestlings when threatening clouds darken the sky. During the brooding routine, the female must respond to such situations and conditions as arise unpredictably in the external environment—heat, cold, rain, wind, and even preying animals. The brooding bird is subject not only to internal stimuli, which give rise to purely instinctive behavior, but to external stimuli as well. The former, because of its rhythmic excitation, imparts to brooding routine a rhythmic character, and the latter, because of its unpredictability, tends to disturb that rhythm.

Before proceeding further, the terms "brooding instinct" and "brooding routine" need clarification. We identify an instinct by the need it tends to satisfy, and that need is evident in the kind of response elicited or adjustment made, which in turn involves movements and acts. In other words, we recognize an instinct in the acts we see invoked. Thus, the instinct to brood is recognized in the posture assumed by the brooding bird, whether covering her nestlings with or without outstretched wings, or standing astride the nest to shield the young. When these postures are repetitive and follow a sequence,

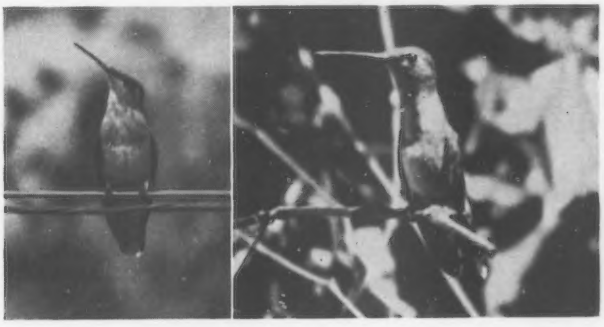

Fig. 58. Two views of female Black-chinned Hummingbird studied at Phoenix, Arizona.

the resulting behavior becomes a routine. The routine, like the posture, is subject to modification, as when cool winds compel the adult bird to brood her young longer than usual.

It is the thesis of this paper that (1) because the physiological stimuli are in ascendence during the early stages of nest life, the brooding-feeding routine tends to rhythm; (2) as the brooding instinct subsides, its rhythmic character disappears, and (3) responses to external stimuli tend to disturb the rhythm of the routine.

Immediately after the eggs are hatched, the brooding instinct is so strong that it is not easily influenced by external conditions, weather particularly. On April 20 (the chicks were hatched on April 18 and 19) brooding was heavy, although the day was clear, the temperature range from sixty to ninety-nine degrees, and the nestlings adequately shielded from direct sunlight. When the older chick was six days old (April 23), a cool wind blew with a velocity of sixteen miles per hour, so that the female, as far as I could ascertain from recorded data, brooded slightly more than she did on April 20. Although 42.3 per cent of the trips to the nest on this date were made for the purpose of brooding only, as against 45.7 per cent on April 20 (see table 1), the average number

TABLE 1

Frequency of observed trips to nest in brooding-feeding routine during first fourteen days of nest life

Date	Age of young (days)	No. and per cent of trips to feed and brood		No. and per cent of trips to brood only		No. and per cent of trips to feed only	
April 20	2, 3	19	54.3	16	45.7	....	....
April 23	5, 6	26	57.7	19	42.3	....	....
April 27	8, 9	4	44.4	....	....	5	55.6
April 29	11, 12	1	10.0	....	....	9	90.0
May 1	13, 14	....	....	....	....	16	100.0

of minutes spent in the nest each time the female visited it was 6.8 for April 20 and 8.1 for April 23 (table 2). These periods represent time spent both in feeding and brooding. If the figures are reduced to time spent in brooding only, we find that on April 23 more time was spent in brooding only than on April 20, an average of 7.5 minutes per trip on April 23 as compared to 6.3 minutes on April 20.

TABLE 2

Duration of brooding and feeding during first nine days of nest life

Date	Age of young (days)	Average time spent in brooding and feeding (minutes per trip)	Average time spent in brooding only (minutes per trip)
April 20	2, 3	6.8	6.3
April 23	5, 6	8.1	7.5
April 27	9, 10	1.8	0.8

The effect of cool winds on brooding behavior is shown in individual sittings (see tables 5 and 6). The longest time spent in one sitting on April 20 was 17 minutes (1:25 p.m. to 1:42 p.m.), whereas on April 23 the longest sitting was 23 minutes (1:43 p.m. to 2:06 p.m.). Eight sittings on April 20 exceeded 10 minutes while fifteen sittings on April 23 exceeded 10 minutes.

Rain had no appreciable effect on the frequency and duration of brooding on April 28, although no detailed data are available for that day. However, at this stage of nest life (ten days after the hatching of the older chick) the nestlings were not in as great need of such care as they were earlier. Frequent showers occurred in the afternoon,

making it impossible to observe what effect the rain would have on the brooding routine. Despite the steady downfall of rain that made food-getting difficult and that jeopardized the use of her delicate wings, the female diligently probed flowers and gleaned shrubs in search of food for herself and her young. From casual observations made indoors, I found no evidence of prolonged stays at the side of her young. In table 1, we note that by April 27, the day preceding the rain, the old bird had discontinued trips to the nest to brood only; and in table 2 we find that only an average of 1.8 minutes per trip was spent in the nest to brood and feed.

TABLE 3

Trend of brooding and feeding routines during first fourteen days of nest life

Date	Total time of observation	Number of trips to nest			Average number of trips per hour to feed	Average number of trips per hour to brood
		Brood and Feed	Brood only	Feed only		
April 20	8 hr. 22 min.	19	16	....	2.3	4.7
April 23	10 hr. 43 min.	26	20	....	2.4	4.2
April 27	3 hr. 32 min.	4	....	5	2.5	1.1
April 29	3 hr. 21 min.	1	....	9	3.0	0.3
May 1	4 hr. 50½ min.	....	....	16	3.1	0.0

The instinct to feed the young arises from the same physiological source as does the instinct to brood, but whereas they differ in kind, both operate in rhythmical fashion. The feeding instinct endures longer in the nest life of the young than does brooding and is less subject to those environmental conditions that influence the latter. Upon examining table 3 we find that the brooding instinct follows a definite but not uniform trend as it wanes. The wide variation in the time spent in observation probably accounts for some irregularity in the trend shown by the figures, as does the fact that during the first nine days of nest life both feeding and brooding together were the object of some of the trips to the nest. Hence, allowance might be made for these factors.

The trend of the feeding routine, unlike that of the brooding routine, is remarkably uniform, despite the intruding factors just cited. As a matter of fact the average number of trips per hour in which feeding was partly or wholly the object of the trips varies only .8 from April 20 to May 1.

When the brooding and feeding behavior occur conjointly in a routine manner, an interesting and significant phenomenon results (see tables 4, 5, and 6). The brooding and feeding routines alternate; that is, each trip made to the nest by the old bird is intended either for the purpose of brooding and feeding, or brooding alone, as is the case early in the nestlings' lives. Later, of course, there is a modification of this pattern; the female then may visit the nest to brood and feed conjointly or simply to feed the chicks. Whenever the old bird assumes the dual task of brooding and feeding, always the brooding act follows feeding, as though the young required as much of the former as the latter.

Note that on April 20 (table 4), the first thirteen trips to the nest follow the order: broods, feeds and broods, broods, feeds and broods. After this the sequence is interrupted on the fourteenth trip, to be resumed beginning with the twenty-third trip. This renewed sequence is maintained until the twenty-ninth trip from which point the alternating pattern is discontinued.

On April 23 (table 5), the rhythmic pattern changes. Now the routine runs: feeds and broods, feeds and broods, broods, feeds and broods, feeds and broods, broods. But the regularity of this sequence is disrupted, for after the tenth trip there is introduced

TABLE 4

Brooding-feeding routine on April 20

Order of trips to nest	Time entered nest	Time left nest	Minutes spent in nest	Minutes spent away from nest	Behavior in nest
1	9:38	9:39	1	....	broods
2	9:42	9:43	1	3	feeds, broods
3	9:44	9:53	9	1	broods
4	10:03	10:08	5	10	feeds, broods
5	10:12	10:22	10	4	broods
6	10:38	10:49	11	16	feeds, broods
7	10:51	10:56	5	2	broods
8	11:00	11:13	13	4	feeds, broods
9	11:17	11:26	9	4	broods
10	11:30	11:31	1	4	feeds, broods
11	11:32	11:36	4	1	broods
12	11:37	11:40	3	1	feeds, broods
13	11:43	11:50	7	3	broods
	(Time out from observation)				
14	12:48	1:01	13	....	broods
15	1:03	1:15	12	2	broods
16	1:17	1:19	2	2	feeds, broods
17	1:25	1:42	17	6	broods
18	1:43	1:47	4	1	feeds, broods
19	2:07	2:17	10	20	feeds, broods
20	2:19	2:30	11	2	broods
21	2:33	2:42	9	3	feeds, broods
22	2:44	2:53	9	2	broods
23	2:55	2:57	4	2	broods
24	3:04	3:08	4	5	feeds, broods
25	3:30	3:45	15	22	broods
26	3:46	3:51	5	1	feeds, broods
27	4:08	4:14	6	17	broods
28	4:19	4:25	6	5	feeds, broods
29	4:35	4:36	1	10	feeds, broods
30	4:45	4:52	7	9	feeds, broods
31	5:00	5:05	5	8	broods
32	5:06	5:11	5	1	feeds, broods
33	5:15	5:17	2	4	feeds, broods
34	5:41	5:52	11	24	feeds, broods
35	5:56	5:58	2	4	feeds, broods

Average time spent in nest, 6.8 minutes.
Average time away from nest, 6.0 minutes.

TABLE 5

Brooding-feeding routine on April 23

1	6:47	6:59	12	....	feeds, broods
2	7:09	7:19	10	9	feeds, broods
3	7:30	7:44	14	11	broods
4	7:44½	7:50	5½	½	feeds, broods
5	7:54	7:59	5	4	feeds, broods
6	8:02	8:11	9	3	broods
7	8:20	8:31	11	9	feeds, broods
8	8:41	8:51	10	10	feeds, broods
9	8:53	9:02	9	2	broods
10	9:15	9:21½	6½	13	broods
11	9:22	9:37	15	½	feeds, broods
12	9:38	9:39	1	1	feeds, broods
13	9:44	9:50	6	5	broods

Order of trips to nest	Time entered nest	Time left nest	Minutes spent in nest	Minutes spent away from nest	Behavior in nest
14	9:52	9:59	7	2	broods
15	10:03	10:08	5	4	feeds, broods
16	10:15	10:25	10	7	broods
17	10:29	10:34	5	4	feeds, broods
18	10:38	10:45	7	4	broods
19	10:49	10:55	6	5	broods
20	10:56	11:03	7	1	feeds, broods
21	11:22	11:33	10	19	feeds, broods
22	11:35	11:53	18	2	broods
23	11:56	12:09	13	3	feeds, broods
24	12:20	12:32	12	11	broods
25	12:34	12:35	1	2	feeds, broods
26	12:35½	12:44	11½	½	broods
27	12:50	1:05	15	6	feeds, broods
28	1:16	1:19	3	11	broods
29	1:21	1:32	11	2	feeds, broods
30	1:43	2:06	23	11	feeds, broods
31	2:09	2:13	4	3	feeds, broods
32	2:27	2:37	10	14	feeds, broods
33	2:40	2:45	5	3	broods
34	2:50	2:53	3	5	broods
35	2:55	3:03	8	2	feeds, broods
36	3:06	3:08	2	3	broods
37	3:09	3:11	2	1	feeds, broods
38	3:19	3:24	5	8	broods
39	3:29	3:33	4	5	broods
40	3:53	4:02	9	20	feeds, broods
41	4:03	4:10	7	1	broods
42	4:26	4:38	12	16	feeds, broods
43	4:42	4:45	3	4	feeds, broods
44	5:02	5:13	11	17	feeds, broods
45	5:18	5:22	4	5	broods
46	5:26	5:30	4	4	feeds, broods

Average time in nest, 8.1 minutes.
Average time away from nest, 6.2 minutes.

an innovation which is a combination of the pattern followed on April 20 and the one inaugurated on the morning of April 23. What is a well-regulated routine during the early hours of each new day, becomes chaotic a few hours later, to be restored somewhat still later in the day.

By April 27 (table 6), the brooding-feeding routine has lost much of its rhythm; by April 29 it just about disappears (not shown by data here); and by May 1 only the feeding routine continues.

TABLE 6

Brooding-feeding routine on April 27

Order of trips to nest	Time entered nest	Time left nest	Minutes spent in nest	Minutes spent away from nest	Behavior in nest
1	8:44	8:45	1	....	feeds
2	9:05	9:10	5	20	feeds, broods
3	9:32	9:34	2	22	feeds, broods
	(Time out from observation)				
4	10:43	10:45	2	....	feeds, broods
	(Time out from observation)				
5	3:01	3:02	1	....	feeds

Order of trips to nest	Time entered nest	Time left nest	Minutes spent in nest	Minutes spent away from nest	Behavior in nest
6	3:45	3:46	1	43	feeds
7	4:02	4:03	1	16	feeds
8	4:21	4:23	2	18	feeds, broods
9	4:50	4:51	1	27	feeds

Average time in nest, 1.8 minutes.
Average time away from nest, 24.3 minutes.

Of the three days recorded in the tables, rhythm is most marked in the pattern of April 20. Had no time been taken out from observation, I might have seen the rhythmical pattern on this day continue for at least four or five more trips beyond the thirteenth, the average number of trips per hour on this day being 4. Nevertheless, the rhythmical pattern is better than that of April 23, on which day an unbroken rhythmical sequence was maintained during only the first nine consecutive trips. The pattern of April 27 is too erratic for comparison, but is significant as a point of reference in demonstrating the decreasing intensity of the brooding instinct. We are reminded that on April 20, when rhythm was most marked, the weather was favorable; while on April 23 a cool wind blew, which probably disturbed the rhythm.

Time spent away from nest indicates relaxation from the parental burden, for it is then that the adult bird attempts to re-create her energies. The proportion of time she devotes to her young and herself varies not only from trip to trip but also from day to day (see tables 4, 5, and 6). If the figures shown at the bottom of the tables are expressed in per cent, we find that the proportion of time spent away from the nest is as follows: 47 per cent for April 20, 43 per cent for April 23, and 94 per cent for April 27. Thus, as the brooding instinct wanes, the bird finds more time for herself.

Phoenix, Arizona, October 9, 1939.

WINTER OCCURRENCE OF SUMMER BIRDS ON VANCOUVER ISLAND, BRITISH COLUMBIA

By IAN McTAGGART COWAN

Victoria, situated on the southern tip of Vancouver Island, is the southernmost city in British Columbia. Eastward, in the Strait of Georgia, lie the American islands of San Juan, Orcas, Lopez, and several of lesser size. Still farther to the east on the adjoining mainland can be seen the perpetually snow-capped peaks of Mount Baker and Mount Rainier in the Cascade Range. To the south and southwest of Victoria, across the Strait of Juan de Fuca, the majestic Olympic Mountains recede from 9000 feet to an ever decreasing altitude westerly, finally to submerge themselves in the Pacific Ocean at Cape Flattery, sixty miles west of Victoria. Lying thus within the rain-shadow of the Olympics and its own high central mountain chain, the low elevations of southeastern Vancouver Island are florally and in some respects faunally different from any other part of British Columbia.

The flora of the area immediately surrounding Victoria and extending in a narrow, discontinuous strip up the eastern side of the island as far as Comox, is coastal Transition Zone in character. Particularly in the southern parts, Garry oak (*Quercus Garryana*) parkland is a typical vegetational type. Arbutus (*Arbutus Menziesii*) is a dominant tree species, and on the drier hillsides manzanita (*Arctostaphylos tomentosa*) forms an open chaparral. Broom (*Cytisus scoparius*) and gorse (*Ulex europaeus*), introduced in the vicinity of Victoria some seventy-five years ago, now form extensive dense thickets on the once open hillsides and provide an abundance of food and shelter for ground birds.

These notes concerning the presence in winter of certain bird species usually regarded as migrant have been derived from specimens in the Provincial Museum and from my own field notes covering the winters of 1935-39.

To investigate the possibility that a change in weather conditions might be involved I have compared below the mean monthly temperature in degrees Fahrenheit and the mean monthly precipitation in inches at Victoria for the ten years 1887-96 and the ten

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
					Temperature							
1887-1896	37	37	43	46	52	56	59	59	54	49	42	41
1929-1938	39	41	45	50	54	58	61	61	58	53	45	42
					Precipitation							
1887-1892	4.6	3.1	2.8	1.5	1.1	1.1	.4	.5	1.9	2.6	6.0	7.3
1929-1938	5.0	3.3	2.6	1.1	.9	1.3	.6	.6	1.2	2.6	3.6	5.5

years 1929-38. It is apparent that while the rainfall was much the same during these two periods, the mean monthly temperature was uniformly greater during the more recent years. Although the observed difference is small it may represent a change in critical minimum temperatures sufficient to make possible the survival of birds that would formerly have perished.

As regards the Lewis Woodpecker and the Golden-crowned Sparrow it is thought that these observations may indicate a change in the migratory habits of some populations of these species. Other instances can be regarded only as sporadic occurrences, resulting perhaps from maladjustment of the individual to stimuli that normally provoke migration. If, however, these avian pioneers can survive the winters in this latitude, it is conceivable that there may arise a hardy wintering population which will add this territory to the normal winter range of the species.

Columba fasciata fasciata. Band-tailed Pigeon. This pigeon is a common to abundant visitor on southern Vancouver Island during the summer months, but the greater part of the population migrates in late September and early October. In the winter of 1936, at least two individuals were seen re-

peatedly on Albert Head, twelve miles west of Victoria. They spent the winter months in a large mixed grove of fir, maple, and arbutus, and fed on the berries of the last.

Asyndesmus lewis. Lewis Woodpecker. The abundance of nesting sites resulting from the logging operations on Vancouver Island has probably contributed to an increase in the population of this woodpecker. It is now an abundant breeding species. The majority migrate during the first two weeks of September and return early in May.

During the winters of 1936-38, a single bird remained in an oak grove in Beacon Hill Park. On April 30, 1937, May 2, 1938, and May 5, 1939, the wintering individual was joined by a second, thought to be its mate. This winter (1939-40), two Lewis Woodpeckers have remained in this grove. Twelve to fourteen others are known to have spent the winter of 1938-39 in the extensive oak groves at Uplands. On December 1, 1939, a pair was seen in that locality but no search was made to determine how many others were present.

Hylocichla guttata. Hermit Thrush. During some winters hermit thrushes remain in fair numbers. I have encountered one or two every winter since 1935. There is a specimen from Comox, taken December 21, 1924, and three others collected at Albert Head, near Victoria, on February 8 and March 31, 1936, in our collections. Of the two specimens taken on February 8, one is typical of the race *nanus* and the other apparently represents the race *guttata*.

Sialia mexicana occidentalis. Western Bluebird. This species is a common migrant and a rather scarce summer resident on southern Vancouver Island. Winter records are as follows: Saanich, February 28, 1936; Comox, January 2 and 17, 1925, and January 31, 1926.

Myadestes townsendi. Townsend Solitaire. Brooks and Swarth (Pac. Coast Avif. No. 17, 1925, p. 119) report the solitaire as occasional in winter in the Fraser Valley of extreme southwestern British Columbia. Though I have not personally encountered the species in the last four winters, there are a number of specimen records in the museum collections. Specimens representing both sexes have been taken at Victoria on March 15, 1896, and on January 25, 1895; at Comox on February 25, 1895; and at Langford on December 2, 1933.

Bombycilla cedrorum. Cedar Waxwing. This bird is an uncommon summer visitant to southern Vancouver Island, but during the winter of 1938-39, it remained in small numbers. The abundance of hawthorn trees that grow semi-wild in and about Victoria provided an adequate food supply of berries until the advent of spring produced a more varied diet.

On January 5, 1939, a flock of about ten waxwings was seen twice during the day, feeding in some hawthorn trees near the museum. They were not seen again until March 8, when seven waxwings and a number of robins came to the same trees. This or another flock was encountered on April 11. On June 6 the first of the returning migrants arrived and several flocks were seen.

Dendroica auduboni. Audubon Warbler. Several of the winter records of this warbler at Victoria are probably best interpreted as illustrating a very early migratory movement northward.

The autumn migration takes place early, usually in late August and early September. In the last four years I have seen none later than August 30. However, on February 2, 1936, I watched a warbler of this species fly in over the Strait of Juan de Fuca and land in some low trees in Beacon Hill Park. I saw the bird several minutes before it reached shore, and followed it with my glasses. It appeared to be coming northward across the strait from the Olympic Peninsula. On February 7 of the same year, I saw several more under similar circumstances.

In 1937, the first Audubon Warbler was seen on February 1, and the second on February 9. A week later they were being seen regularly. On December 24, 1938, a single male was watched at close range as it fed in the oaks of the hospital grounds, but no others were observed until March 20, 1939, when several were feeding in the trees bordering the lake in Beacon Hill Park.

Agelaius phoeniceus caurinus. Northwestern Red-wing. The red-wing is an abundant summer visitant in the region, but only a few remain through the winter. Specimens in the museum were taken at Langford, December 6, 1934; Comox, February 7, 1926; and Victoria, February 26, 28, 1896.

Zonotrichia leucophrys gambelii. Gambel White-crowned Sparrow. This sparrow occurs as a migrant on Vancouver Island where the breeding race is *Z. l. pugetensis*. The single winter specimen in the museum collection was taken at Comox on January 30, 1926, by R. M. Stewart.

Zonotrichia coronata. Golden-crowned Sparrow. During the winter of 1938-39, this sparrow occurred in fair numbers from Victoria north at least to Cowichan Lake. On January 4, 1939, I saw several in an abandoned gravel pit near Victoria. The sides of the pit were covered with dense broom thickets, and in these the sparrows spent the winter. One was taken and is now in the Kenneth Racey collection. On March 13, 1939, a juvenile was shot at Cowichan Lake. In early December, 1939, I saw Golden-crowned Sparrows at Cowichan Lake and near Victoria.

Provincial Museum, Victoria, British Columbia, January 9, 1940.

THE DISTRIBUTION OF THE WESTERN SOLITARY SANDPIPER

WITH TWO ILLUSTRATIONS

By P. A. TAVERNER

The status of the Western Solitary Sandpiper (*Tringa solitaria cinnamomea* Brewster) has long been uncertain. Swarth (Condor, vol. 37, 1935, pp. 199-201) has expressed doubt as to its validity and others have been unable to ascribe a distinct distribution to it.

The National Museum of Canada has amassed a considerable series of the species from the more northern sections of the continent that throws some light upon the subject. The series consists of 142 specimens taken in Canada, from Nova Scotia to British Columbia and Alaska, and from the southern international boundary to the Mackenzie delta. In addition, thanks to the courtesy of Dr. I. McT. Cowan, we have been able to borrow 22 specimens from British Columbia from the Provincial Museum, Victoria.

The postulated characters of *cinnamomea*, as distinguished from *solitaria*, are:

1. Larger size.
2. Cinnamon instead of white spotting on back.
3. Marbling on inner web of outer primaries.
4. White bars on tail averaging narrower.
5. Middle pair of rectrices often (usually?) wholly deep grayish brown.
6. More extensive white spotting on back of adult.

(Other characters suggested by original describer have been abandoned by more recent investigators.)

A cursory examination of the material reveals that these characters are independently variable and only partly linked. Further investigation shows that there is little or no sexual difference in size or coloration.

1. Larger size as exhibited by wing length is characteristic of *cinnamomea* as regards average and extremes, but there is considerable overlap with *T. s. solitaria*. No individual specimens, except perhaps the extremes (wing over 5.25 inches, 133.5 mm.; or under 5 inches, 127 mm.) can be identified by this character with more than approximate certainty.

2. Cinnamon spotting on the back is restricted to the juvenile (first fall plumage), the adult of *cinnamomea* being inseparable from *solitaria* by this character. However, it seems constant in juvenility and any specimen showing heavily colored back spotting can confidently be referred to *cinnamomea*.

3. Marbling of the outer primary is variable in extent. It may constitute a conspicuous pattern, may be reduced to traces, or even be absent altogether. It is common to all plumages and ages. Specimens carrying it can definitely be ascribed to *cinnamomea*, though many individuals of that race are without it.

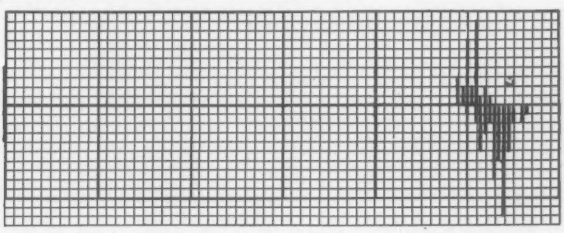

Fig. 59. Graph of wing lengths of 27 *Tringa s. solitaria* from Ontario and eastern Canada (upper group) and of 48 *T. s. cinnamomea* identified by other characters than size (lower group). Measurements laid off from line at left; small squares represent tenths of inches.

4, 5, 6. These characters as listed above are unrecognizable or are too slight to be useful in making determinations.

In estimating the racial value of the characters, it was noted that marbled primaries and buffy back-spotting occur more or less commonly in regions from Manitoba westward but not at all in central Ontario and eastward. From this it is assumed that they are good racial criteria, and that all specimens from east of the Great Lakes can confidently be referred to *solitaria*. On this basis a wing length graph was drawn (fig. 59) using 27 eastern specimens as typical of *solitaria* and 48 from Manitoba and more westerly localities identified as *cinnamomea* by primary marbling and buffy back spotting. The wing lengths are laid off individually from a common base line at the left, the height of each line showing the number of specimens of similar wing length.

It can be seen that *cinnamomea* averages considerably larger in this measurement; 35 are larger than the largest *solitaria*, but 13 overlap that race. However only 5 *solitaria* are smaller than the smallest *cinnamomea*. Thirty-five out of 75 specimens are not certainly recognizable as to race by means of wing length and this criterion therefore becomes of secondary importance in the separation of the races.

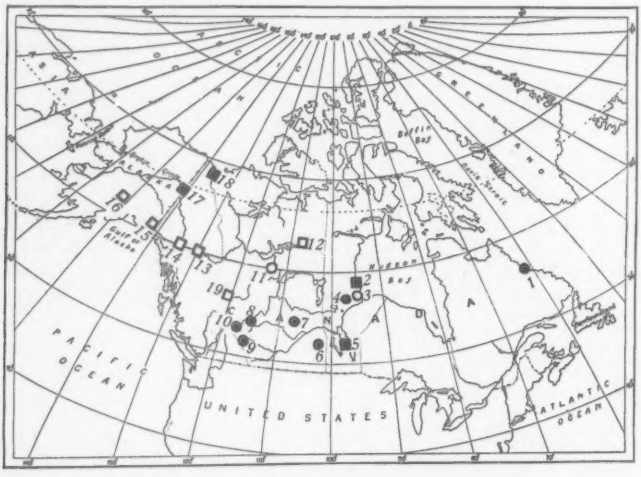

Fig. 60. Breeding localities of Solitary Sandpipers. Circles represent *T. s. solitaria*; squares, *cinnamomea*. Definitely established nesting places distinguished by solid symbols.

The following data indicate the known breeding ranges of the races and form the basis for construction of the map showing distribution (fig. 60).

1. Labrador coast. ♂, ♀ in National Museum of Canada, accompanying eggs in collection of Major W. M. Congreve, Denbigh, Great Britain.

2. Churchill, Manitoba. specimens in National Museum of Canada. All referable to *cinnamomea*. The nest has since been found in this locality by A. L. Wilk, 1938.

3, 4. Bird and Ilford, Manitoba, 150 and 213 miles, respectively, south of Churchill. Specimens in National Museum of Canada. All *solitaria*, breeding commonly at the latter place and presumably at the former.

5. Lake St. Martin, Manitoba. (Shortt and Waller, Contr. Royal Ontario Mus. Zool., No. 10, pp. 21-22, 1937.) An ultra-typical *cinnamomea*, with egg in oviduct ready for shell. This is a rather disturbing specimen, suggestive of nesting far south of what other evidence indicates is the normal

breeding range. However, it can be suggested that this species, which has no nest building requirements (it lays in the deserted nests of other birds), may arrive on the breeding ground with eggs ready for deposition. This individual may still be regarded as a possible migrant with a considerable flight before it, or else as an erratic outlier.

6, 7. Saskatchewan. (Mitchell, Canadian Field-Naturalist, vol. 38, 1924, p. 107.) Breeding of *solitaria* reported from Big River, Beaver River and Hudson Bay Junction. Knowing the care with which the author made his subspecific identifications, this is accepted at face value.

8. Belvedere, Alberta. (Taverner, Nat. Mus. Canada, Bull 50, 1928, p. 91.) Birds breeding commonly and several nests found. A considerable series collected. Breeding birds all *solitaria, cinnamomea* appearing later in migration.

9, 10. Didsbury, Alberta. Breeding specimens ascertained by examination to be *solitaria*, and report of breeding near Camrose, Alberta, by F. Farley assumed to involve same race.

11. Wood Buffalo Park, Alberta. Specimens in National Museum of Canada, 4 juveniles all *solitaria*, and 4 adults all *cinnamomea*. One of the former has down still adherent to the tail and undoubtedly represents the race that breeds locally, the adults probably being migrants.

12. Finnie River, Thelon Sanctuary, N. W. T., between Great Slave and Baker lakes. Specimen in National Museum of Canada. Most waders begin their fall migration very early in the season. This is particularly true of this species and ordinarily no birds of early July date can confidently be regarded as resident. The date of this specimen, July 26, elsewhere might raise suspicions of its being a migrant, but it is here regarded as probably of local type.

13. Atlin, British Columbia. (Swarth, U. C. Publ. Zool., vol. 30, 1926, pp. 70-72; Proc. Calif. Acad. Sci., vol. 23, 1936, pp. 43-44.) The species was breeding freely in the neighborhood. The two specimens described by Swarth may be referable to different races, but since many *cinnamomea* are practically inseparable from *solitaria* by any known test, the breeding association is assumed to be the former. In addition, there are five specimens examined from the collection of the Provincial Museum of British Columbia. Four of these are plainly marked *cinnamomea*, whereas one is small and without primary marbling and would, if taken at eastern or southern localities, unhesitatingly be called *solitaria*.

14. Upper Yukon River. (Bishop, N. A. Fauna No. 19, 1900, pp. 68-69.) Specimens apparently from actively breeding communities at Log Cabin, British Columbia, and various points on the upper Yukon River stated to have "wavy markings on the inner webs of the outer primaries" (marblings?). Hence, these definitely are *cinnamomea*.

15. Mt. Logan, Alaska. (Laing, Anderson and Taverner, Nat. Mus. Canada, Bull. 56, 1929, pp. 73-74.) Summer specimens, that almost certainly represent the breeding stock, are *cinnamomea*.

16. Interior of Alaska. (Dice, Condor, vol. 22, 1920, p. 178.) Specimens taken on upper Kuskokwim River, which are almost certainly of breeding stock, are referred to *cinnamomea*. On the supposition that the identification was made from the specimens and not on the grounds of general probability, as is so often done, the identification can be accepted.

17. Eastern Alaska. (Osgood, N. A. Fauna, No. 30, 1909, pp. 35-36.) Specimens from actively breeding community near Circle, Alaska, referred to *cinnamomea* and accepted on aforementioned grounds. (See 16.)

18. Mackenzie Delta, N. W. T. Specimens in National Museum of Canada. Note on one label states that specimen contained an egg ready to lay. Three, all *cinnamomea*.

19. Tupper Lake, Peace River District, British Columbia. A *cinnamomea* taken June 25, where the species was reported breeding, though this particular specimen was not connected with the fact.

Besides these breeding stations of birds of demonstrable race, there are a great number of presumptive migrants from all the provinces except Prince Edward Island. All from east of the Great Lakes are *solitaria*, that is, none have any recognizable characters of *cinnamomea*. Through the southern prairie provinces of Manitoba, Saskatchewan and Alberta, and throughout British Columbia both forms occur on migrational dates, with *solitaria* predominating east of the mountains and *cinnamomea* to the west.

It is evident from these data that the Western Solitary Sandpiper is a valid genetic strain, plainly recognizable in the majority of specimens but inseparable from the eastern race in a few. Also that the name "Western" is a misnomer and that its normal distribution is northwestern instead of western, breeding from Hudson Bay to and including Alaska, and southward from tree limits to northern British Columbia, Great Slave Lake and Churchill.

National Museum of Canada, Ottawa, January 12, 1940.

FROM FIELD AND STUDY

Barnacles on Birds.—On the morning of August 7, 1938, about 15 miles south of the Farallon Islands, off San Francisco Bay, California, the writer collected two female Pacific Fulmars (*Fulmarus glacialis rodgersii*). The birds were shot on the wing while circling the Allan Hancock Foundation cruiser, Velero III, as she lay hove-to, dredging for marine life. After a bit of unique maneuvering of the Velero by Captain Hancock, the birds were picked up and immediately inspected for ectoparasites by the staff parasitologist, Gus Augustson. A peculiar condition of the belly became apparent. Small clusters of young peduncled barnacles of the genus *Lepas* were attached to the outer barbs of the belly feathers. There were several dozen clusters, each composed of three or four individuals of different sizes, with a few solitary individuals between. This illustrates the gregarious instinct of the free-swimming larva at the time of attachment.

Upon returning to the laboratory with several of the barnacles preserved in alcohol, the specific identity of the cirriped was established as *Lepas hillii* Leack, a species that is distinguished with difficulty from the cosmopolitan goose-necked barnacle (*Lepas anatifera* Linnaeus). The smallest specimens were barely distinguishable as to species, but the larger ones had well-calcified capitular valves and distinct peduncles. One specimen had a capitulum 3.0 mm. long with a peduncular length of 1.1 mm.

We can look upon this condition as accidental and occurring only during a period of the year when the fulmars are consistently roosting on the water. Certain species of littoral sessile barnacles are able to withstand considerable desiccation between the tides, but members of the genus *Lepas* regularly attach themselves to floating materials or permanently submerged objects, as described in Hoek's report on the cirripedia of the Challenger Expedition (Challenger Reports, Zoology, vol. 8, 1883). Thus we must assume that in order for these barnacles to have developed to the aforementioned size, the fulmars must have been on the water most of the time.

Accounts of barnacles on birds seem to be rather scarce in the literature; at least, the writer has found it so in the reports on cirripedians. However, I might quote from Hoek's review of the literature the following (*op. cit.*, p. 7): "A new genus (*Ornitholepas*) was proposed (1874) by Targioni-Tozzetti for a species of Cirripedia inhabiting the tail feathers of *Priofinus cinereus*, a bird of the Southern Atlantic and the Indian Ocean. Gerstäker supposes that the *Ornitholepas australis*, Targioni-Tozzetti, is only a larva of a Cirriped in its *Cypris*-stage."

Since this observation the writer has had opportunity to collect a considerable number of oceanic birds, some of which were confined to the surface by molting primaries, but no other occurrence of barnacles on the feathers has been noted.—Granville Ashcraft, *Allan Hancock Foundation, University of Southern California, April 8, 1940.*

The Vermilion Flycatcher at Santa Barbara.—On April 7, 1940, a Vermilion Flycatcher (*Pyrocephalus rubinus mexicanus*) was taken near Santa Barbara. The exact locality is what is called Pendola Flats and is situated on the Santa Ynez River midway between Gibraltar and Juncal reservoirs about 10 miles in an air line northeast of the city. The bird was first seen darting after flies from its perch on a wire fence. It is an immature male with a white throat and the red on the under parts is mixed with white. The specimen is now no. 3778 in the collection of the Santa Barbara Museum of Natural History.—Egmont Z. Rett, *Santa Barbara Museum of Natural History, Santa Barbara, California, May 8, 1940.*

Desert Sparrow Hawk and Pasadena Screech Owl in the Same Nest.—A Pasadena Screech Owl (*Otus asio quercinus*) was found in an old hole up ten feet in a dead Joshua tree stump on the Mohave Desert north of the San Bernardino Mountains. Ten inches down from the opening, on dead wood chips, there were two fresh eggs of the owl. A week later, on April 16, 1939, a Desert Sparrow Hawk (*Falco sparverius phalaena*) was flushed from this hole and investigation disclosed that the nest contained the two owl eggs and three eggs of the hawk, one being a runt of about one-third normal size. An owl, probably the owner of the two eggs, was in another hole about one hundred feet away, incubating a single egg of her own. On April 23 the original hole was still in the possession of the hawk and contained an additional egg of the hawk; the owl had deserted her egg. The hawk must have believed "a turn about is fair play" for in 1935 (Condor, vol. 38, 1936, p. 250) I found in this same vicinity an owl in possession of a mixed set.—Wilson C. Hanna, *Colton, California, February 24, 1940.*

More Notes on Salt-feeding of Red Crossbills.—An interesting corroboration of Aldrich's "Notes on the salt-feeding habits of the Red Crossbill" (Condor, vol. 41, 1939, pp. 172-173) came

to the writer's attention at the Deer Park Guard Station on the Boise National Forest, Idaho, during the past summer (1939).

At the edge of the horse pasture of the station a block of sulfurized salt is kept for the horses and the deer that come in at night. The grass for several feet around the block has been removed by their pawing, so that there is a clear view of the ground.

On the morning of August 12 I observed nine Red Crossbills (*Loxia curvirostra*) on this area and flushed them to a nearby lodgepole pine tree. They returned to the salt area almost as soon as I sat down about fifteen feet from it. The birds could then be seen feeding on some coarse salt scattered around the block, using the tongue in the same manner as described in detail by Aldrich. One male bird was seen to "lick off" salt from the block itself.

For several weeks after this, a flock of the same size, probably the same one, visited the block regularly. On several instances, birds were seen "fighting," by posturing, for the favorable feeding place under the block, which was several inches above the ground.

Other birds noted at the salt during the same period were the Western Mourning Dove, Cassin Purple Finch, Evening Grosbeak, and Pine Siskin. The dove, however, apparently used the place for dusting and resting during the middle of the day, whereas the other birds were seen in early morning or late evening and probably fed on the salt, as there was little if any vegetable material near the block.—WILLIAM H. MARSHALL, *Bureau of Biological Survey, Boise, Idaho, January 29, 1940.*

A European Widgeon in Solano County, California.—Mr. Paul S. Wetmore of Benicia, California, shot a European Widgeon (*Mareca penelope*) on the grounds of the St. Germain Gun Club on Grizzly Island, Solano County, California, on October 29, 1939. This appears to be the first recorded occurrence of this species in my county since 1884, when two were taken at Rio Vista (see Grinnell, Pac. Coast Avif. No. 11, 1915, p. 33). Mr. Wetmore, who is a veteran duck hunter, recognized the bird as an unusual species and he presented it to me for my collection of scientific skins. It is a male; weight 1 pound, 12 ounces; length 19½ inches and wing spread 31½ inches.—EMERSON A. STONER, *Benicia, California, December 16, 1939.*

Posturing of the Western Sandpiper.—Observations of the 1940 spring shore-bird migration in the San Francisco Bay area have led me to notice the general presence of an interesting habit of the Western Sandpiper (*Ereunetes mauri*). In large flocks of feeding sandpipers there is often some little "conflict" between individuals; one will meet another head on while food hunting or again will

Fig. 61. Tail-elevating posture of Western Sandpiper.

chase its neighbors away from the area in which it is feeding. On such occasions the head may be lowered and the tail thrown up stiffly, the wings not being noticeably dropped. A rigid posture will be held for a moment (fig. 61) then the bird will relax, go on about its food hunting, and the tail will gradually descend to a normal position as shown in figure 62.

Bent (Life Histories of North American Shore Birds, U. S. National Museum, Bull. 142, 1927, p. 256) records the courtship behavior of this sandpiper on its northern nesting grounds. The elevation of the tail is pointed out as one part of a complicated display. It seems possible that this tail-

Fig. 62. Normal feeding position of Western Sandpiper.

elevating posture while in migration may be the first manifestation of a chain of instincts which will become more fully developed as the birds move northward and the breeding season becomes further advanced.—DAVID GELSTON NICHOLS, *Berkeley, California, May 2, 1940.*

New Bird Records for Lincoln County, Nevada.—The period of May 16 to 28, 1939, was spent in the field in Lincoln County, Nevada, with Mr. Stanley G. Jewett of the Bureau of Biological Survey and Mr. Merle R. Gross of the Soil Conservation Service. Messrs. Adrey E. Borell and W. S. Long, also of the Soil Conservation Service, were with us for two days. The purpose of the field work was to obtain material for a preliminary wildlife management plan for the county. In the course of our observations the following birds not recorded for Lincoln County by Linsdale (Pac. Coast Avif. No. 23, 1936) or Cottam (Condor, vol. 38, 1936, pp. 122-123) were observed, and in some cases collected (approximate elevations taken from the U. S. Department of Commerce airways maps).

Phalacrocorax albociliatus ssp. Double-crested Cormorant. Seen on Frenchy Lake, Pahranagat Valley, 4800 feet, Lower Sonoran Zone.

Egretta thula brewsteri. Brewster Egret. About half a dozen seen at Coyote Spring, 2700 feet, Lower Sonoran Zone, and apparently the same birds seen next day at Upper Pahranagat Lake.

Butorides virescens anthonyi. Green Heron. An immature seen at Hiko Lake, Pahranagat Valley, 5300 feet, Lower Sonoran Zone; an adult seen several times at upper end of Rose Valley, 5500 feet, lower edge of Transition Zone.

Plegadis guarauna. White-faced Glossy Ibis. About 15 seen on a reservoir at Comet, 4500 feet, Upper Sonoran Zone.

Dafila acuta tzitzihoa. Pintail. Seen on Maynard Lake and Lower Pahranagat Lake, 3500 feet. (Estimated 20,000 seen on the lakes in Pahranagat Valley, September 21, 1938.)

Spatula clypeata. Shoveller. A pair seen on Maynard Lake.

Accipiter atricapillus. Goshawk. Immature seen above Sheep Spring, Juniper Mountains, 6900 feet, Transition Zone; adult (male?) on Wilson Peak, 7500-8500 feet, Transition-Canadian Zone; nest with 3 eggs, both parents present, May 21, 20 miles north of Ursine, 6000 feet, Upper Sonoran-Transition Zone (see Bond, Condor, vol. 42, 1940, pp. 100-103).

Buteo swainsoni. Swainson Hawk. Seen in Delmar Valley and Tule Flat, both in the Joshua tree belt.

Dendragapus obscurus obscurus. Dusky Grouse. Several seen, and much sign, on Wilson Peak, 8000-8500 feet, Transition-Canadian Zone; also reliably reported from 4 miles west of Geyser Ranch, 8000-9000 feet.

Centrocercus urophasianus. Sage Hen. Four males seen on Table Mountain (12-15 miles east of Pony Spring), 8500 feet, Transition Zone; also reported from several other localities.

Phasianus colchicus. Ring-necked Pheasant. Found locally common in meadow, hay and crop lands of Pahranagat Valley, Meadow Valley Wash, Ursine, Eagle, and Rose valleys.

Charadrius nivosus nivosus. Snowy Plover. A female found dead on the highway, 3000 feet, in Lower Sonoran, *Covillea* association, 7 miles by road south of Maynard Lake on May 16. This seems to be the fourth recorded specimen from the state.

Capella delicata. Wilson Snipe. Calling in lower Spring Valley, 5300 feet.

Numenius americanus ssp. Long-billed Curlew. One seen at Muddy Spring, 3500 feet, in company with Black-necked Stilts (*Himantopus mexicanus*).

Pisobia minutilla. Least Sandpiper. A flock of a dozen or more at Lower Pahranagat Lake, 3600 feet.

Chlidonias nigra surinamensis. Black Tern. Several at Frenchy Lake, at Comet Reservoir, and at Upper Pahranagat Lake.

Megaceryle alcyon caurina. Belted Kingfisher. One seen at Hiko Lake.

Empidonax griseus. Gray Flycatcher. A male collected by Jewett in the Cedar Range 12 miles east of Panaca, 6900 feet, May 17, has been identified by Dr. Pierce Brodkorb. Wing and tail are smaller than average, and the bill is extremely narrow.

Otocoris alpestris utahensis. Horned Lark. Common in the County. A male picked up on the highway in Delmar Valley, 5300 feet, has been so identified by Dr. Alden H. Miller, rather than *O. a. leucolaema* as recorded by Linsdale. The specimen shows approach toward *O. a. leucansiptila*.

Tozostoma bendirei. Bendire Thrasher. The male of a pair collected by Jewett in Delmar Valley, 5500 feet. (See Jewett, Condor, vol. 42, 1940, p. 126).

Oreoscoptes montanus. Sage Thrasher. Locally common all over the Upper Sonoran and higher zones. A male collected by Jewett on May 20, 15 miles west of Caliente.

Hylocichla guttata auduboni. Hermit Thrush. Common on Wilson Peak about 8000 feet; male collected by Jewett, May 25; also seen on Table Mountain, 7500-8500 feet.

Dendroica aestiva rubiginosa. Yellow Warbler. A male collected by Jewett at Carp, 2700 feet, undoubtedly a migrant (identified by A. H. Miller). This appears to be a new record for the state of Nevada.

Wilsonia pusilla pileolata. Pileolated Warbler. A male collected at Sheep Spring, Juniper Mountains, 6700 feet, May 20.

Spinus pinus pinus. Pine Siskin. A small flock seen and heard in cottonwoods at Muddy Spring, 3500 feet, Lower Sonoran Zone.

Loxia curvirostra ssp. Red Crossbill. Six seen at close range in Douglas fir-white fir forest. Wilson Peak, 8500 feet.

Junco caniceps caniceps. Gray-headed Junco. Male and female collected May 26 by Jewett, and others seen, Canadian Zone, Wilson Peak, 8500 feet.

Zonotrichia leucophrys ssp. White-crowned Sparrow. Several seen on Wilson Peak, 7500-8500 feet.

In addition to new birds for the County, certain of those previously recorded deserve mention as having been seen "out of place" according to life-zone, in unusual numbers, or doing something remarkable otherwise.

Buteo borealis calurus. Red-tailed Hawk. A nest containing three young in a juniper about 12 miles east of Pony Spring was visited twice and was found to contain on one visit remains of an immature Piñon Jay (*Cyanocephalus cyanocephalus*), 4 young and 2 adult jack rabbits (*Lepus californicus deserticola*), and one young and one adult chipmunk (*Eutamias dorsalis*); on the next visit it contained remains of 1 adult jack rabbit, one immature Piñon Jay and a garter snake (*Thamnophis* sp.).

Aquila chrysaëtos canadensis. Golden Eagle. An immature seen carrying a ground squirrel (*Citellus variegatus grammurus*) 5 miles east of Crystal Spring; two seen feeding on dead jack rabbits along the highway, north end of Delmar Valley; nest with two well-grown young about 10 miles north of Panaca, May 21.

Falco mexicanus. Prairie Falcon. A magnificent stoop by one of these birds was seen near Comet. It shot downward several hundred feet to seize a ground squirrel (*Citellus townsendii mollis*), which it carried off without apparent loss of speed.

Lophortyx gambelii gambelii. Gambel Quail. Found in a wide variety of situations, from Lower Sonoran (2700 feet) to the lower edge of the Transition (6200 feet) Zone; much commoner in desert brush near water or wet meadows.

Porzana carolina. Sora. Remains of 2 found in pellets of a Horned Owl (*Bubo virginianus occidentalis*), 4 miles north of Alamo, Pahranagat Valley.

Oxyechus vociferus vociferus. Killdeer. A nest containing three eggs, situated a few hundred yards south of Crystal Spring was destroyed by cattle.

Zenaidura macroura marginella. Mourning Dove. Extremely abundant practically throughout the County. Between 5000 and 10,000 were estimated to have come to water at Coyote Spring, 2700 feet, the evening of May 23.

Gymnorhinus cyanocephalus. Piñon Jay. No occupied nest was found, but young were still being fed by the parents on May 20. Several times small flocks were seen in the Delmar Valley in the Joshua trees.

Turdus migratorius propinquus. Robin. Nesting commonly as low as the Lower Sonoran Zone, as in the Pahranagat Valley, but only in wet areas with willow, cottonwood, ash, or box elder.—R. M. Bond, *Soil Conservation Service, Berkeley, California, November 13, 1939*.

Killdeer Swimming.—On December 20, 1938, as I was driving along the Harkins road one-half mile west of Watsonville, California, I saw a Killdeer (*Oxyechus vociferus*) cross the road with one wing dragging. As it was the wrong time of year for the bird to be simulating injury, a stop was made and the bird pursued. It ran for a way along the bank of a drainage ditch, then seeing that it was about to be captured, ran down the bank and unhesitatingly entered the water. In spite of the broken wing, the bird floated as trimly as any bird that normally swims. The feet were seen working steadily and to my surprise the bird moved readily upstream against a moderate current. The whole performance surprised me, as I had watched the Killdeer for years, but had never seen it enter the water and swim before, but then I had never before seen it necessary for the bird to resort to that medium for escape.—Albert C. Hawbecker, *Watsonville, California, March 19, 1940*.

Random Notes from the Humboldt Bay Area.—*Puffinus tenuirostris*. Slender-billed Shearwater. A female was taken on September 12, 1937, near the entrance of Humboldt Bay by Robert Talmadge.

Philacte canagica. Emperor Goose. A male was taken on April 26, 1925, on south Humboldt Bay. On December 6, 1927, a male and two females were taken on the marshes about two miles east of Eureka.

Falco columbarius suckleyi. Black Pigeon Hawk. Three birds were collected on the peninsula across the bay from Eureka in 1925: males on January 24 and 31, and a female on February 14.

Stercorarius parasiticus. Parasitic Jaeger. A female was taken on September 2, 1933, on the ocean side of Humboldt Bay.

Rissa tridactyla pollicaris. Pacific Kittiwake. A male was found on the ocean beach August 14, 1937, by Robert Talmadge.

Xema sabini. Sabine Gull. A male was collected February 7, 1932, on the ocean side of Humboldt Bay.

Cyclorrhynchus psittacula. Paroquet Auklet. A female was taken on April 5, 1924, by George McDaniel on the ocean side of Humboldt Bay.

Strix occidentalis caurina. Northern Spotted Owl. Two young, not long out of the nest, were taken on July 29, 1913, in a grove of lowland fir, redwood, and Sitka spruce about three miles south of Eureka. On July 28, 1916, a young male was taken at the same place. Two young females were taken in Eureka, one on August 20, 1931, and the other on August 20, 1939. A live adult female was left in a sack at my back door by an unknown "owler" on January 18, 1939.

Penthestes atricapillus occidentalis. Oregon Chickadee. A male was taken October 23, 1924, also in Eureka.

Vermivora celata sordida. Dusky Warbler. A female was taken in Eureka on January 1, 1935.

Geothlypis trichas sinuosa. Salt Marsh Yellow-throat. An immature female was taken in Eureka on November 25, 1917.

Junco hyemalis hyemalis. Slate-colored Junco. A female was taken on March 17, 1935, by Miss Leno Moll in Eureka.

Zonotrichia albicollis. White-throated Sparrow. A male was taken May 8, 1934, a mile outside of Eureka, by Miss Leno Moll.

The above-mentioned specimens have been identified by the late Dr. Joseph Grinnell and by Dr. Robert T. Orr of the California Academy of Sciences.—John M. Davis, *Eureka, California, April 20, 1940*.

Black Vultures Perch on Telephone Wires.—The foot of a vulture, fitted largely for walking and perching, would hardly seem adapted for grasping as slender a support as a telephone wire. The usual procedure of a vulture, when choosing a place to alight, is to pick some sturdy limb, pole-top, or rock, where the whole foot acts as a support, with the long toes functioning as aids to balance.

At other times, too, as when tearing meat from a carcass with the beak, the toes seem to function primarily as balancers rather than as supporters. It was therefore surprising to me to see several Black Vultures (*Coragyps atratus*) use their toes to support their weight when they chose to rest on a wire.

On February 2, 1940, I visited Guaymas, about halfway down the Gulf of California in Sonora, Mexico. A closely-packed group of perhaps seventy Black Vultures was feeding energetically on the great piles of sea bass heads dumped as refuse near the shore of the bay by one of Guaymas' leading

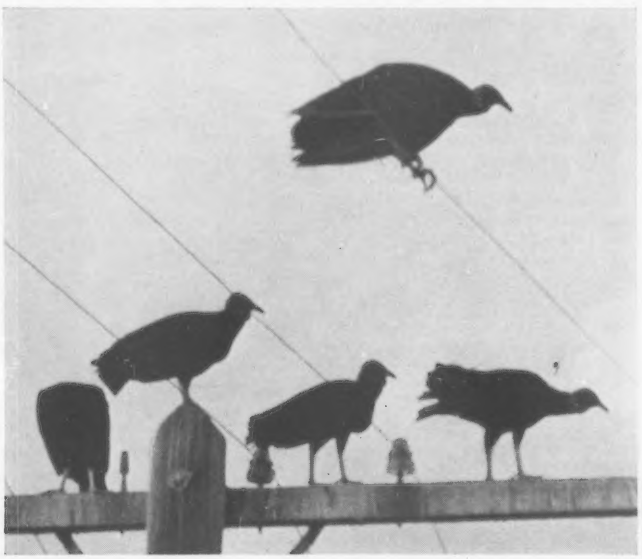

Fig. 63. Black Vulture balancing on telephone wire with wings partly opened and weight over toes.

fish canneries. I watched the birds from a distance of several hundred feet as they hopped about stiffly, grabbing for the best morsels. They were unusually wary for Mexican vultures, often so tame around the streets, and it was impossible for me to get the "close up" I wanted. When the birds took flight, many of them flew to the nearby telephone poles to alight. After the crossbars were filled, they continued to crowd in, while several of the late comers settled on the wires. Surprisingly enough they seemed to experience no great difficulty in balancing, and several remained on them for the best part of a minute, while I advanced for a picture. The photograph I was able to take (fig. 63) shows that the toes are simply curved like hooks over the wire, while the body is thrown slightly forward, making the center of gravity fall directly over the toes rather than over the end of the tarsometatarsus. The wings of the balancing bird are held slightly out as aids in maintaining equilibrium. The usual standing posture is plainly shown in the position of the other birds.

Such skill in balancing must be derived from repeated practice, as the vultures are not naturally suited for perching on such unsteady and precarious objects. Since the telephone wires shown here are near the spot where the fish heads are always dumped, the birds must frequently take to them when alarmed and thus have developed their unusual skill in balancing.—KARL W. KENYON, *Pomona College, Claremont, California, April 25, 1940.*

An Unusually Low Nest of the Nuttall Woodpecker.—For the past three years, E. A. Stoner and I have been making trips to a small lake near Cordelia, California, where several nests of the Nuttall Woodpecker (*Dryobates nuttallii*) have been found in the surrounding oak-covered hills. On April 23, 1939, we located a nest not over 30 inches above the ground in an oak stump. On

examining the hole we found a male Nuttall Woodpecker incubating. We reached in and lifted the bird off the eggs, which were just hatching, and examined it for a few moments. On being released the bird returned directly to the eggs. The female was not seen. Most of the nests found were from 10 to 16 feet above the ground; thus 30 inches seems an unusually low nest for these woodpeckers.—J. DUNCAN GRAHAM, *Benicia, California, January 31, 1940.*

Extension of Range of the Black-chinned Sparrow into Utah.—While on a collecting trip in southwestern Utah in the spring of 1939, an unfamiliar bird song was heard by Mr. Aaron Ross, one of our party. The bird when secured proved to be a male Black-chinned Sparrow (*Spizella atrogularis evura*). Later others were collected, making a total of four. These specimens, all males (now numbers 5793-5796 Mus. Zool. University of Utah), were taken April 29 and 30, 1939, at the Danish Ranch, 4200 feet, 5 miles northwest of Leeds, Washington County, Utah. They were collected in an area of sparse juniper and piñon pine along more or less rocky ridges. From the fact that the birds were actively singing and showed enlarged gonads, we inferred that they were birds established in the area and about to breed, although the certainty of this was by no means established.—WILLIAM H. BEHLE, *University of Utah, Salt Lake City, Utah, May 1, 1940.*

Plain Titmouse Occupies Cliff Swallow Nest.—The colony of Cliff Swallows (*Petrochelidon albifrons*) at the Life Sciences Building on the Berkeley campus of the University of California was established in 1935. The early history of the colony has been recorded by Grinnell (Condor, vol. 39, 1937, pp. 206-210). Since 1936 the swallow nests have often been usurped by English Sparrows (*Passer domesticus*), which usually take possession before the swallows arrive in the spring.

On April 2, 1940, a Plain Titmouse (*Baeolophus inornatus*) was seen to enter two of the swallow nests. It remained in each one for only a few seconds as though merely prospecting. Again on April 3 a titmouse was noted near the nests but was driven away by the swallows. Two titmice were observed entering a swallow nest on April 17. The swallows showed belligerence when the titmice entered the nest on April 20. The successful occupation of the swallow nest was proven on May 10 when a titmouse was observed carrying food into the usurped nest and the cries of young birds were plainly heard.

The retort-shaped mud nest of a cliff swallow is not an extremely radical departure from the usual nest site of the Plain Titmouse in a cavity in a tree. Due to the activities of conscientious tree surgeons, typical sites are now practically nonexistent on the Berkeley campus. It seems likely that swallow nests would be occupied only when no other suitable sites are available.—CHARLES G. SIBLEY, *Museum of Vertebrate Zoology, Berkeley,* and DONALD HEMPHILL, *Calistoga, California, June 24, 1940.*

NOTES AND NEWS

Fig. 64. M. French Gilman, pioneer naturalist of the southwestern deserts. Member of the Cooper Ornithological Club since 1901.

After an interval of almost three years since the publication of volume three of Peter's "Check-list of Birds of the World," volume four of this work made its welcome appearance in June of this year. Consistent in plan and style with preceding sections, it includes the orders Cuculiformes, Strigiformes, Caprimulgiformes, and Apodiformes. The author points out that the owls have required particular attention from a revisionary standpoint. In the introduction is a brief comparison of numbers of genera and species included in comparable sections of Sharpe's and Peter's lists, demonstrating that in the latter list the total of species and subspecies has increased about 40 per cent, whereas the genera, with modern conservative treatment, have been reduced 30 per cent. Some generic names currently in use for birds covered by the A. O. U. Check-list are replaced as follows: *Micrathene* takes priority over *Micropallas* for the elf owls; *Aegolius* for like reason is used instead of *Cryptoglaux* for the saw-whet owls and their relatives; *Scotiaptex*, for the great gray owls, is synonymized under the more inclusive *Strix*, and *Antrostomus*, for the whip-poor-wills, under *Caprimulgus*. The specific name for the Snowy Owl becomes *Nyctea scandiaca* and the Long-eared Owl is designated as a race of *Asio otus* of Europe. Literature up through December 31, 1938, has been considered in the compilation of the work. Mr. Peters is to be congratulated on the sustained progress made on this valuable check-list.—A. H. M.

Many Cooper Club members may be interested in a proposal to form an organization concerned with the dynamics of the origin of species and races. This suggestion comes from Professor Alfred E. Emerson of the University of Chicago who would be happy to learn of persons with such interest. A loose organization of cooperating members is contemplated which would sponsor the publication of a booklet about twice a year for spreading pertinent information concerning bibliographical citations and notes from various members and laboratories. One main end to be gained is the exchange of information between botanists and zoologists interested in diverse phases of the origin of species. The suggested name of the organization is the Association for the Study of Speciation.—A. H. M.

MINUTES OF COOPER CLUB MEETINGS

SOUTHERN DIVISION

FEBRUARY.—The Southern Division of the Cooper Ornithological Club held its monthly meeting at the Los Angeles Museum on Tuesday, February 27, 1940, at 8:00 p.m., with Robert T. Moore presiding and about 100 members and guests present.

The minutes of the January meeting were read and approved. Eight applications for membership were read as follows: F. H. Bosbyshell, 829 North Occidental Blvd., Los Angeles, California; Hutchinson I. Cone, Jr., 1215 Barnett Bldg., Jacksonville, Florida; John Walton Livermore, 130 East End Ave., New York City, New York; C. Carroll McGettigan, 2644 Filbert St., San Francisco, California; and George W. Pyle, Box 647, Berwyn, Pennsylvania, all proposed by W. Lee Chambers. Mrs. Arthur E. Hussey, 6017 Atlas Place, Seattle, Washington, by Elizabeth L. Curtis; Mary V. Hood, 138 South Wilton Drive, Los Angeles, California, by C. V. Duff; and Mary Ferguson Coble, 3400 San Marino, Los Angeles, California, by Ed. N. Harrison.

A letter from William Alanson Bryan expressing appreciation for nomination to honorary membership was read by the secretary.

President Moore read a letter from Dr. J. A. G. Rehn of the Delaware Valley Ornithological Club expressing appreciation for the congratulatory communication commemorating its fiftieth anniversary.

Dr. Herbert N. McCoy, Chairman of the Auditing Committee, reported tentative approval of the financial report for 1939, pending examination of the papers by the Northern Division representative.

A motion, initiated by Mr. George Willett and seconded by Dr. Raymond B. Cowles, for the omission of the March meeting because of the scheduled Annual Meeting, March 22 and 23, was unanimously approved.

Mr. Willett said that many observers had reported an unusual influx of Lark Buntings throughout the southeastern portion of the state.

President Moore introduced the speaker, Mr. C. A. Harwell, Yosemite Park Naturalist, who discussed problems in the recording of bird songs. Due to the high range of bird notes and general lack of correspondence in key to notes on the musical scale, duplication by means of musical instruments is rendered practically impossible. Good reproductions by vocal sounds or whistling of the voices of many species of birds were enthusiastically received by the Cooper Club members. Kodachrome lantern slide portraits of many of the birds and views of habitats illustrating the seasonal beauty of Yosemite were shown. A brief discussion followed concerning methods employed in photographing the birds.

Adjourned.—SHERWIN F. WOOD, *Secretary.*

NORTHERN DIVISION

MARCH.—The regular monthly meeting of the Northern Division of the Cooper Ornithological Club was held on Thursday, March 28, 1940, at 8:00 p.m., in Room 2503 Life Sciences Building, Berkeley, with President Painton in the chair and about 65 members and guests present. Minutes of the Northern Division for February were read and approved. Frank Bene, 2242 West Madison Street, Phoenix, Arizona, was proposed for membership by Alden H. Miller. The nomination of William Alanson Bryan for Honorary Membership in the Club, originating in the Southern Division and given first reading before the Northern Division at the February meeting, was unanimously accepted.

Mrs. Grinnell announced that Mr. Robert C. Miller, of the California Academy of Sciences, had agreed to represent the Cooper Club at the Seattle meeting of the Western Division of the American Association for the Advancement of Science.

The first speaker, Mr. Thomas L. Rodgers, presented a paper entitled, "Frequency of Occurrence of Birds on the Berkeley Campus," which he had prepared in collaboration with Mr. Charles G. Sibley. He stressed the need of a statistical method of analyzing bird populations which would afford a basis for comparing different areas.

Mr. Alden H. Miller then reported on the 14th Annual Meeting of the Cooper Club, held at the Los Angeles Museum, March 22-24.

Field notes gathered by members during the Easter vacation occupied the rest of the program. Mr. Carl Koford reported that "Oscar," the famous banded Condor, now 10 months of age, had been seen by a field party just before the annual meeting. Mr. Robert C. Miller announced the presence of a male Wood Duck on Stow Lake in Golden Gate Park, San Francisco. Mrs. Kelly recounted the activities of an ambitious pair of Bush-tits in Alameda. They were building December 21, the young left the nest February 8, and on the 13th the nest was being repaired in preparation for the second brood, which was seen to be fed March 19.

The president announced that the new membership roster was being prepared and asked members to communicate any change of address to the officers.

Adjourned.—FRANCES CARTER, *Recording Secretary.*

FOURTEENTH ANNUAL MEETING

The fourteenth annual meeting of the Cooper Ornithological Club was held Friday, March 22, to Sunday, March 24, 1940, at the Los Angeles Museum, Exposition Park, Los Angeles, California. On Friday morning, following the registration of members and visitors, the meeting was called to order by President Robert T. Moore of the Southern Division. Roland J. McKinney, Director of the Los Angeles Museum, welcomed the group. Alden H. Miller expressed appreciation to the Museum and members of the Southern Division for arranging the meetings.

Howard Robertson, President of the Corporation, called the business meeting to order at 9:30 a.m. George Willett, as Secretary, read the minutes of the last business meeting, which were approved. Two committees were appointed by President Robertson as follows: One to check proxies, John McB. Robertson, Chairman, John T. Emlen, Jr., and Stanley G. Jewett; and the other to present nominations for directors for the coming year, Loye H. Miller, Chairman, Herbert N. McCoy, Harry R. Painton, Eric C. Kinsey, and John G. Tyler. The business session was then adjourned until Saturday morning.

Papers read at the opening session were: Avifauna of a Transition island in the Mohave

Desert, by A. H. Miller; Loss of corresponding feathers on each side at a time other than the molt, by H. Michener and J. R. Michener; Studies of the so-called oil, or uropygial gland, by J. F. Wohnus; Notes on bird postures, by D. G. Nichols; and Dispersal of young gulls from nesting colonies (as shown by early records of the Pacific Gull Color-Banding Project), by Grace Sargent.

Luncheon was served to the assembled members and guests in the Los Angeles Museum Cafeteria, after which the group visited a new Exhibit, "Birds of Passage," in the Science Rotunda of the Museum.

Papers read at Friday afternoon's session were: Speciation in the flickers, by F. H. Test; New forms from Mt. Mohinora, the highest mountain of Northern Mexico, by R. T. Moore; Frequency of occurrence of birds on the Berkeley Campus, University of California, by T. L. Rodgers and C. G. Sibley; Downy loons, with their parents and relations, by L. B. Bishop; Midwinter distribution of the American Crow in California, by J. T. Emlen, Jr.; and Distribution and variation of Red-winged Blackbirds in Utah, by W. H. Behle.

At the request of Clinton G. Abbott, the presiding officer, Stanley G. Jewett remarked upon the encouraging prospects for increased duck and goose populations.

On Friday evening the Board of Governors and Directors met for dinner at the home of Mr. and Mrs. Robert T. Moore in Flintridge, following which the annual meeting of the Board was held (see p. 228).

On Saturday morning, March 23, 1940, members met in the Los Angeles Museum, Exposition Park, Los Angeles, California, at 9:30 a.m. for the business session continued from Friday, with Howard Robertson presiding.

The Proxy Committee reported that, of a total membership of 851, 81 members were present in person and 450 were represented by proxies. The Chairman therefore declared a quorum present.

The Secretary reported election by the two divisions of the Club, since the last Annual Meeting, of 119 members, from and including Number 1017 on the club membership roster, to and including Number 1135 on said roster. On motion by Loye Miller, seconded by Harry R. Painton, and unanimously carried, the election of these members was ratified.

The Secretary read the following applications for membership in the Club: Marjorie W. Ambler, Mrs. Geo. S. Gaines, Frederick W. Haecker, R. Allyn Moser, Theodora Nelson, John W. Stacey and George Mott Tuttle, Sr., proposed by W. Lee Chambers, and Edward Budd and Vanche Etoile Plumb, by John McB. Robertson. On motion by Loye Miller, seconded by Alden H. Miller, and unanimously carried, these applicants were elected to membership.

Treasurer John McB. Robertson then gave some figures regarding the variation in numbers of members from year to year, and reported the foundation of the Joseph Grinnell Publication Fund.

The Nominating Committee reported the following nominations for Directors for the ensuing year: John S. Appleton, W. Lee Chambers, Hilda W. Grinnell, Jean M. Linsdale, Alden H. Miller, J. R. Pemberton, Howard Robertson, John McB. Robertson and George Willett. On motion by Loye Miller, seconded by Harry R. Painton, and duly carried, the nominations were closed and the nominees declared elected.

Treasurer John McB. Robertson announced that a new roster of Club members was ready for publication.

On motion by Loye Miller, seconded by Sherwin F. Wood, and unanimously carried, the thanks of the Club were tendered the local committee on arrangements for the fourteenth annual meeting, the assistance of the ladies being especially commended.

The meeting adjourned at 10:10 a.m.

President Robertson announced the business session closed at 10:10 a.m. and turned the meeting over to one of the four original Cooper Club members of 1893, namely Harry R. Painton, to preside during presentation of the papers.

The following papers were read: Fossil storks of America, by Hildegarde Howard; A collection of fossil birds from McKittrick, California, by Ida De May; Some problems in water fowl management, by W. W. Bennett; and notes on the Black-footed Albatross, by Loye Miller.

Papers presented on Saturday afternoon were: The Flammulated Screech Owl; its food and habitat, by J. T. Marshall; A Comparative analysis of the avifaunae of the San Bernardino, San Jacinto, and Santa Ana mountains, by W. E. Pequegnat; Experiments on intercovey relationships in the Valley Quail, by W. Howard; Heat or cold?—factors conducive to the evolution of homoiothermism, by R. B. Cowles; and Motion pictures of the Golden and Bald eagles, and the Red-bellied Hawk, by Ed N. Harrison.

Throughout the meetings time was allowed for discussion of papers, and stimulating conversations were continued long after the regular sessions. During the Friday meeting Robert T. Moore and Clinton G. Abbott presided, while on Saturday these duties were performed in turn by Harry R. Painton, George Willett, and Alden H. Miller.

On Saturday evening, approximately 100 members and guests gathered at Carl's "Viewpark,"

Crenshaw Blvd. at Vernon Avenue, in Los Angeles, for the annual dinner. The feature of the evening was the excellent motion picture in color of "The Early Life of 'Oscar,' the Condor," exhibited by J. R. Pemberton.

On Easter Sunday, March 24, a field trip under the direction of W. A. Kent was taken to Tucker's Hummingbird Sanctuary near Orange, California.—S. F. Wood, *Secretary, Southern Division.*

GOVERNORS' MEETING

The eighteenth annual meeting of the Board of Governors of the Cooper Ornithological Club was held at the home of Mr. R. T. Moore, Flintridge, California, on March 22, 1940. Vice-president Tyler called the meeting to order at 8 p.m., with the following members present: Clinton G. Abbott, J. S. Appleton, Louis B. Bishop, Frances Carter, W. Lee Chambers, Joseph S. Dixon, John T. Emlen, Jr., Hilda W. Grinnell, Harry Harris, Hildegarde Howard, Eric C. Kinsey, Luther Little, Herbert N. McCoy, Alden H. Miller, Robert T. Moore, Harry R. Painton, J. R. Pemberton, Sidney B. Peyton, Howard Robertson, John McB. Robertson, John G. Tyler, George Willett, and Sherwin F. Wood.

Proxies were presented as follows: H. W. Carriger, J. S. Cooper, Joseph Mailliard, Harold Michener, E. Lowell Sumner, Jr., Curtis Wright, held by A. H. Miller; Amelia S. Allen by W. Lee Chambers; Guy C. Rich by George Willett; Tracy I. Storer by John T. Emlen, Jr.

Minutes of the seventeenth annual meeting of the Board of Governors were read and approved. The report of the Business Manager, W. Lee Chambers, and of the Treasurer, John McB. Robertson, for 1939 was presented by Mr. Robertson, which report is appended to these minutes. Mr. Herbert N. McCoy, reporting for the auditing committee, which consisted of S. F. Wood, J. S. Cooper, and himself, stated that the securities and accounts had been checked over and were found to be in good order. J. R. Pemberton, seconded by J. S. Dixon, moved that the report of the auditing committee be adopted. Motion carried. The report of the Business Manager and Treasurer was then approved on motion of Howard Robertson, seconded by L. B. Bishop.

Vice-president Tyler called for the report of the Editors, which was presented by Alden H. Miller. Suggestions offered concerning different methods of citation in text in the *Condor* were discussed by the Board. On motion by George Willett, seconded by Howard Robertson, the report was accepted.

Harry R. Painton raised the question of participation in the Pan-American Congress to be held in Washington, D.C., this year. Because no formal request to participate had been received and because the Club does not seek representation at meetings of such general character, it was voted, on motion by George Willett, seconded by W. Lee Chambers, that the matter be laid on the table.

Alden H. Miller moved that a vote of thanks be extended to the local committee for the arrangements so effectively made for the current Fourteenth Annual Meeting of the Club in Los Angeles. Motion seconded by J. S. Dixon and unanimously carried.

Appreciation of the hospitality of Mr. Robert T. Moore in entertaining the Board of Governors at his home for dinner and the meeting was unanimously voted on motion by George Willett, seconded by W. Lee Chambers.

Approval of the Board was given to sponsoring the Fourth Ten-year Index to the Condor as a Pacific Coast Avifauna. This index is being prepared by John McB. Robertson.

Results of the election of officers for the coming year were: President, John G. Tyler; Vice-president, John T. Emlen, Jr.; Secretary, Alden H. Miller.

Following the business session of the Board, Mr. Moore showed motion pictures of his travels in Finland in the summer of 1938 and, upon special request, the film taken in Mexico of the spectacular Tufted Jay.

Adjourned.—Alden H. Miller, *Secretary.*

DIRECTORS' MEETING

A meeting of the Board of Directors of the Cooper Ornithological Club was held in the banquet room of Carl's Restaurant, Crenshaw Blvd. at Vernon Ave., Los Angeles, California, at 10:30 p.m. on Saturday, March 23, 1940. The following members of the Board were present: John S. Appleton, W. Lee Chambers, Hilda W. Grinnell, Alden H. Miller, J. R. Pemberton, Howard Robertson, John McB. Robertson and George Willett.

President Howard Robertson presided at the meeting and George Willett acted as Secretary.

On motion by John S. Appleton, seconded by J. R. Pemberton and duly carried, the following officers were elected for the ensuing year: President, Howard Robertson; Senior Vice-President, Alden H. Miller; Junior Vice-President, J. S. Cooper; Secretary, George Willett; Assistant Secretary, Hilda W. Grinnell; Treasurer, John McB. Robertson; Business Manager, W. Lee Chambers; Editor, Alden H. Miller; Associate Editor, Jean M. Linsdale. Each officer present so elected accepted his office.

The meeting adjourned at 10:40 p.m.—(Signed) George Willett, *Secretary.*

For Sale, Exchange and Want Column.—Each Cooper Club member is entitled to one advertising notice in any issue of The Condor free. Notices of over ten lines will be charged for at the rate of 15 cents per line. For this department, address JOHN McB. ROBERTSON, Buena Park, California.

BIRD REFERENCE work of any kind done at the U. S. National Museum for distant ornithologists. I have full access to the collections and library. Terms: 50 cents per hour. Address: DR. E. M. HASBROUCK, *U. S. National Museum, Washington, D. C.*

WANTED—Transactions of the American Game Conference, National Game Conference, and the National Conference on American Game Breeding.—LEONARD WING, *Washington State College, Pullman, Washington.*

FOR SALE—Papers and books on all natural history and allied subjects—geology, ethnology, paleontology, etc. Proceedings, annuals, journals, bulletins, etc. Publications of federal and state governments, colleges and societies. No item too small for attention.—FRANK N. BASSETT, *722 N. Orange Drive, Los Angeles, Calif.*

WILD LIFE PHOTOGRAPHS—For sale in black and white or Kodachrome color. These are suitable for ecological, life history or semi-popular articles. Photographs on hand to date include many Californian species and the larger mammals and birds of Yellowstone Park. These photographs were taken (as far as possible) with subjects in natural activity or pose.—NATASHA SMITH, *2203 Piedmont Ave., Berkeley, Calif.*

WANTED—Bent's Life Histories, Nos. 126 and 130; and North American Flora on Sedges by McKenzie.—H. S. COLEMAN, *Box 254, F. E., College Station, Texas.*

FOR SALE—A few sets of Dawson's "The Birds of Washington"; copies of the originally published "Parts" I & II of "The Birds of California"; and some water-colors of birds and animals by Major Allan Brooks and George Miksch Sutton.—MRS. W. LEON DAWSON, *Santa Barbara, Calif.*